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PATENT REQUEST: STANDARD PATENT/PATENT OF ADDITION

We, being the persons identified below as the Applicant, request the grant of a patent to the person identified below as the Nominated Person, for an invention described in the accompanying standard complete specification.

Full application details follow.

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[54] Invention Title: A METHOD AND SYSTEM FOR GATHERING AND ANALYZING CUSTOMER AND PURCHASING INFORMATION

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By our Patent Attorneys,
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(57) Claim

A method and system for gathering and analyzing customer and purchasing information permits a retailer or retail chain to process transactional information involving large numbers of consumers and consumer products. Product information is gathered that uniquely identifies a specific product by type and manufacturer and grouped into generic product clusters. Consumers are similarly grouped into consumer clusters based on common consumer demographics and other characteristics. Consumer retail transactions are analyzed in terms of product and/or consumer clusters to determine relationships between the consumers and the products. Product, consumer, and transactional data are maintained in a relational database. Targeting of specific consumers with marketing and other promotional literature is based on consumer buying habits, needs, demographics, etc. A retailer queries the database using selected

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criteria, accumulates data from the database in response to that query, and makes prudent business and marketing decisions based on that response. Queried information from the database may be communicated to a printing subsystem for printing promotional literature directed to particular customers based on cluster information stored in the database.

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AUSTRALIA

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ORIGINAL
COMPLETE SPECIFICATION
STANDARD PATENT

Application Number:

Lodged:

Invention Title: A METHOD AND SYSTEM FOR GATHERING AND ANALYZING CUSTOMER AND PURCHASING INFORMATION

The following statement is a full description of this invention, including the best method of performing it known to us :-

A METHOD AND SYSTEM FOR GATHERING AND ANALYZING CUSTOMER AND PURCHASING INFORMATION

BACKGROUND AND SUMMARY OF THE INVENTION

Retail store chains, especially grocery chains, survive on high sales volumes and low profit margins. Accordingly, retail industries are constantly searching for cost effective mechanisms to reach consumers and encourage them to shop at a particular retail store. While radio and television advertising are available, and of course used, it is expensive and not particularly targeted.

Although the newspaper is the traditional and less expensive mechanism for advertising in the retail industry, newspaper advertising has many disadvantages. First, newspapers provide only limited (and expensive) space for relatively generic retail advertising, making it difficult to differentiate from other competing retail stores. Second, to reduce costs, retailers typically "shotgun" newspaper advertisements to "generic" consumers rather than direct them to any particular consumer group or need. Third, if multiple retailers use the same newspaper to advertise their goods, sensitive pricing information may potentially be leaked to competitors. For example, if one retail grocer is undercut by a single penny per pound on the price of a turkey at Thanksgiving time, that grocer could stand to lose several hundred thousand dollars in revenue.

Consequently, a less expensive, less restrictive, and more effective way for retailers to direct advertisements and other purchasing inducements to consumers must be developed. Encouraging retail store loyalty necessitates determining consumer needs which vary greatly across demographic boundaries. Therefore, there is a need to make direct marketing available to retailers.

Regional and national consumer demographics data available from Nielson and other agencies regarding consumer product movement is too general to be useful to specific retailers. Additionally, these agencies do not address product movement demographics in order to learn the particular needs and buying habits of people purchasing particular products.

Increased sales and customer loyalty may be obtained by offering a reward system. For example, the airline industry rewards loyal customers using frequent flyer programs. Attempts have been made to develop "frequent shopper" marketing and sales promotion services in retail sales. Some retail grocery chains, for example, provide coupons based upon consumer purchase amounts accumulated during a particular shopping transaction. Coupons tend to be for arbitrary goods which are not directed to any particular needs or interests of the specific consumer.

Other retailers reward frequent shoppers by distributing cards to customers who regularly

purchase name brand goods manufactured by a particular vendor. Cards are used at participating retail stores to identify the customer and record purchases of particular brand goods and to award points based on the number of brand good purchases. Points are accumulated, and gifts may be selected by the card member from a catalogue.

Another card type service offered to retailers is the "Reward America Program" from Citicorp. Consumers received monthly rebates based on the number of brand name items purchased, e.g. buy three loaves of Wonderbread™ and receive $0.50; buy five loaves, receive $0.75; buy seven loaves and receive $1.00. The consumer receives quarterly rebate booklets and periodic statements showing how many items must be purchased to obtain rebates.

Unfortunately, none of these services address or meet the needs and interests of retailers. For example, many of these existing programs like the Reward America Program service develop "brand loyalty" rather than retail store loyalty. Moreover, the retailer does not own the underlying consumer purchasing data regarding frequent shopper purchases for particular brand products. As a result, the retailer lacks direct access to this information for use in advertising and promoting the retail store itself.

None of these services allow a retailer to identify particular consumer groups and particular consumer needs. For example, in the grocery retail

business in the United States, double income families are pressed for time and show a trend toward less time being spent shopping and preparing meals. Retail grocers are challenged to provide incentives to encourage these kinds of shoppers into their stores. Targeted advertising would allow retailers to appeal to current public awareness of the need for natural and/or healthy foods. Identifying those shoppers having special dietary needs, e.g. medical problems and then marketing to those dietary needs may be particularly advantageous to retailers. Providing products that appeal to certain ethnic groups instead of offering generic grocery items may also be profitable.

Identification of such groups, targeting advertisements to the identified groups, and measuring the results of that advertising are primary goals of the present invention. An integrated system is required which allows individual retailers to determine buying patterns and habits of customers to determine customer needs and preferences with respect to retail products sold. Such a system must accumulate transactional data, provide meaningful analysis, and allow retailers to target specific consumers based on determined buying patterns and preferences with promotional and advertising literature tailored to preferences and needs. To achieve those goals, such a system must be capable of inputting and categorizing enormous amounts of consumer and product data, organizing that data in a logical

fashion, and providing data analysis useful for marketing and advertising.

According to the present invention, the above-identified problems are overcome and the above-stated goals are achieved by providing a retailer or a retail chain with the ability to process transactional information involving large numbers of consumers and consumer products by gathering product information that uniquely identifies a specific product by type and manufacturer, grouping that product information into product clusters, and analyzing consumer retail transactions in terms of those product clusters to determine relationships between the consumers and the products. Product, consumer, and transactional data are maintained in a relational database. Targeting of specific consumers with marketing and other promotional literature is based on consumer buying habits, needs, demographics, etc. A retailer queries the relational database using selected criteria, accumulates data generated by the database in response to that query, and makes business and marketing decisions based on that accumulated data.

A method of the present invention further includes receiving consumer information describing demographic characteristics of various consumers, grouping consumers into consumer clusters based on specifically defined demographics criteria, and analyzing product transactions in terms of those consumer clusters to determine relationships between consumers and products. Using product and/or

consumer clusters, a retailer determines relationships between products and consumers as well as the effectiveness of a particular product promotion.

Since the number of consumers and products far exceeds the number of consumer clusters and product clusters, the clustering technique of the present invention permits a manageable amount of data to be extracted from a much larger amount of transactional, product, and demographics data, maintained, and readily accessible in a database. Moreover, cluster parameters and definitions may be modified and redefined by the retailer without modifying underlying consumer and/or product information.

A system according to the present invention for optimizing retail marketing operations based on purchasing transactions of consumer products includes as basic components: a relational database, means for receiving consumer identifying data and product purchase transactional data, means for grouping that data into clusters of information based on predefined criteria, means for storing the cluster information in the database, and means for analyzing the stored cluster information to determine buying behaviors of retail consumers.

Point of sale terminals, such as (but not limited to) the checkout registers in a retail grocery store, record consumer purchase transactions typically by means of scanning the bar code label

attached to the product. Although optical means for detecting this coded information is preferred, other mechanisms for reading this data could also be used, e.g. magnetic strip reading, etc. Recorded consumer purchase transaction information is communicated from the point of sale terminals to the receiving means.

A supervisory retail processor performs in an alternative aspect of the present invention an intermediary function between the point of sale terminals and the relational database system. The supervisory retail processor stores a master product list containing all valid product numbers, e.g. bar codes, for every product carried by the retail store. The transactional information received from the point of sale terminals is checked against the product list to ensure that the registered product numbers are valid. The supervisory retail processor then transmits the master product list and the transaction log to the system receiving means or repositioning.

A user interface at the retail store or at the supervisory retail processor allows a retailer to input specific queries to the system to retrieve particular types of information from the relational database. For example, these queries may relate to determining purchasing behaviors of retail consumers, determining the effectiveness of promotional efforts with respect to particular products, and ascertaining particular

characteristics (demographics and otherwise) of consumers purchasing particular products.

Clustering is employed in a system of the present invention to associate consumer identifying data into a plurality of consumer clusters based on predefined consumer criteria. Similarly, products from the product list are assigned to product clusters based on predefined product criteria. A retailer may modify the predefined consumer and product criteria to dynamically alter the consumer and product clusters. Thus, huge amounts of data are stored, managed, accessed, and analyzed in an effective and practical way using clusters.

The system according to the present invention further includes a mechanism for gathering consumer identifying data and encoding that data into digital format. The encoded consumer data is transmitted directly to (or via the supervisory computer) the system receiving means. Consumer identifying data includes such things as consumer demographics, income ranges, product preferences and other characteristics. Once consumer identifying data are received, membership cards are issued to consumers with coded identifiers uniquely identifying a consumer. Point of sale terminals at retail stores detect consumer coded identifiers by scanning membership cards and associate identifiers with products purchased by a consumer at that point of sale terminal.

The present invention includes a printing subsystem connected to the analyzing means for printing promotional literature directed to particular consumers based on cluster information stored in the relational database. In one embodiment, the printing subsystem generates and directs relevant promotional literature to certain consumers using names and address lists from the relational database. Promotional literature may include, for example, advertisements, newsletters, and coupons. With the printing subsystem of the present invention, customized promotional information most relevant and most likely to be of interest to a particular consumer based on their buying behaviors and their demographics is included in targeted promotional literature mailed to that consumer.

Thus, it is a primary object among many other objects of the present invention to provide efficient creation and management of a relational database system readily accessible by retailers to effectively target specific consumers and consumer groups with relevant advertisement, promotional, and informational direct mailed media. These and other features and advantages of the invention will become clear from an inspection of the detailed description of the invention, read in conjunction with the drawings, and from the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a schematic block diagram including

a high level functional overview of an exemplary system for implementing the present invention;

FIGURE 2 is an exemplary block diagram of the retail point of sale subsystem shown in FIGURE 1;

FIGURE 3 is an exemplary block diagram of the supervisory processor shown in FIGURE 1;

FIGURE 4 is a flow chart of exemplary procedures performed by the consumer application subsystem in the present invention;

FIGURE 5 is an exemplary functional block diagram of the Consumer Purchase Repository subsystem shown in FIGURE 1;

FIGURE 6 illustrates the clustering concept according to the present invention;

FIGURE 7 is a process flow diagram of exemplary program control processes performed in the present invention;

FIGURE 8 is a data model diagram for data structures provided in the relational database of the Consumer Purchase Repository subsystem according to the present invention;

FIGURE 9 is a process data flow diagram for the point of sale subsystem according to the present invention;

FIGURE 10 is a process flow diagram for the customer application subsystem according to the present invention;

FIGURE 11 is a data flow diagram of a consumer purchase repository subsystem according to the present invention;

FIGURE 12(a) - 12(i) are data models showing data structures provided in the repository administration subsystem of the present invention; and

FIGURE 13 is a data flow diagram of exemplary program control processes performed by the user interface subsystem for detailed implementation according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

In the following description, for purposes of explanation and not limitation, an exemplary embodiment including specific components, interfaces, and techniques is provided in order to provide a thorough understanding of the present invention. However, it will be apparent to those skilled in the art that the present invention may be practiced in other embodiments and may depart from specific details. In other instances, detailed descriptions of well known devices, circuits, and programming procedures are omitted so as not to obscure the description of the present invention with unnecessary detail.

The method and system according to the present invention provide a retail business entity whether an individual retail store or a retail chain of stores (hereafter "retailer") with the ability to determine and analyze buying behaviors with retailer consumer customers (hereafter simply "consumers"). By categorizing consumer retail products (hereafter "products") into product groupings referred to as product clusters and/or consumers by specific characteristics and demographics into consumer clusters, consumer buying behaviors may be identified, tracked, and employed by retailers in direct, consumer marketing as described in more detail below. For purposes of simplicity in describing exemplary embodiments, the present invention is referred to as the "frequent shopper system."

While exemplary embodiments of the present invention are described in terms of retail grocer stores and chains, it will be understood by those skilled in the art that the present invention may be applied to any retail store or retail chain of operations including, for example, department store chains, toy store chains, and other retail industries such as financial and insurance retail industries.

The frequent shopper system is illustrated generally in FIGURE 1 and includes retail point of sale (POS) subsystem 20 and user interface 21, retailer supervisory processor 22 and user interface 23, consumer application subsystem 24, consumer

purchase repository subsystem 26 (a relational database), marketing analysis tools 32, and printer and direct mailing subsystems 36. Retail point of sale subsystem 20, consumer application system 24, and consumer purchase repository 26 capture, warehouse, maintain and allow queried access of consumer characteristics and buying behaviors. Marketing analysis tools 32 such as conventional statistical analysis software packages, e.g. SPSS, Cognos Impromptu™, Cognos Power Play™, etc., and print and direct mailing subsystem 36 are used to create value-added information targeted to particular consumers and a medium (e.g. advertisements, newsletters, coupons, etc.) for communicating that information with a consumer.

Consumer application subsystem 24 provides a mechanism by which consumers provide various demographic and other characteristic information as consumer data to consumer purchase repository 26. Product transactions that occur at the retail point of sale system 20 may be forwarded to the retailer supervisory processor 22. Daily product transaction log files, a master product item list, and consumer data from consumer application subsystem 24 are forwarded to the consumer purchase repository 26. The daily product transaction log files may be forwarded via retailer supervisory processor 22 or directly from the retail POS subsystem 20. Data is categorized and stored in clusters (product and/or consumer). Various buying behaviors and patterns may be extracted from the cluster data stored in consumer purchase repository 26 in the form of

statistical extracts 30 and used by retailers along with conventional software market analysis tools 33 to determine statistical patterns, e.g. buying habits based on specific consumer demographics, for formulating retail marketing strategies. Consumer and product information retrieved from consumer purchase repository 26 in the form of print system extracts 34 is forwarded to the printer and direct marketing subsystem 36.

Retail point of sale subsystem 20, illustrated in more detail in FIGURE 2, includes a plurality of conventional point of sale terminals 50A, 50B, etc. Retail point of sale systems with bar code scanning capabilities are available from such manufacturers as IBM Corporation, NCR, etc. However, in the preferred embodiment of the present invention, "smart cards" are provided for consumers who purchase goods from the retail store or chain.

The term smart card refers to a variety of wallet-sized cards having a programmable memory for storing larger amounts of data in a more secure format than, for example, a magnetic strip card. While a smart card's appearance may contain traditional characteristics of a credit card, e.g. it may have a magnetic strip, it includes a memory on an additional surface which permits a read/write device to read data from and write data to card memory. The following memory types are available: serial memory which has limited storage capacity, an integrated chip (IC) having larger amounts of memory and an on-chip microprocessor, and optical memory

using write once, read many (WORM) technology for storing still larger amounts of data.

Preferably, the IC chip smart card may be employed in the frequent shopper system because the dynamic memory permits data to be updated, e.g. product transactions at particular stores, and provides enhanced security, e.g. multiple passwords for different stored information. Communication between the smart card and a POS terminal can be via direct contact with an optical or magnetic reading device or via RF communication link. Other benefits of the IC smart card are (1) credit can be issued from the POS terminal 50a onto the smart card and (2) the database at the consumer repository 26 can be updated as needed. Moreover, if a retailer does not have on-line access to the frequent shopper database, recent transactional information recorded on the consumer's smart card may be credited for a current transaction.

Each point of sale terminal includes a card-code reader 52A, 52B, etc. for scanning/reading codes assigned to various products purchased by a consumer during a purchasing transaction as well as identification and other information from consumer membership cards, i.e. smart cards. Card-code readers 50A and 50B may be optically based, but the present invention envisions other kinds of reading mechanism as well, e.g. a magnetic strip detector for reading coded information on a magnetic strip, etc.

All products sold by a retailer are conventionally assigned a universal product code (UPC) for example in the United States or a European article number (EAN) in Europe to uniquely identify each product sold by a retailer. UPC and consumer identifying data are received in a local computer 54 which includes the typical CPU 56, memory 58, and user interface 60. Point of sale product information and consumer identification information associated with each point of sale transaction are communicated via conventional communications interface/controller 62 via retailer supervisory processor 22 or directly to the consumer-product purchase repository 26. Conventional communication interface/controllers, e.g. ETHERLINKII™, may be obtained, for example, from 3COM. The communications interface controller 62 for conducting communications over a network may be accomplished by conventional modem-type communications over the telephone network or by a hardwire cable network using Ethernet™ and related software.

Local computer 54 maintains a product item list and daily transaction log file for detecting the UPC of each product purchased by a particular consumer during a transaction to (1) ensure that the UPC corresponds to a valid code stored on a master list, (2) manage conventional inventory functions, and (3) regulate communications of daily transactions between point of sale subsystem 20 and retailer supervisory processor 22 or consumer product purchase repository 26. Computer software required

to run inventory product code comparisons and transaction log compilation in local computer 54 or supervisory processor 22 is conventional and available from vendors who supply POS systems.

As shown in further detail in FIGURE 3, retailer supervisory processor 22 includes conventional CPU and memory 64, user interface 66, communications interface controller 68, and two external memories: transaction log file 70 and master product bar code file 72. Retailer supervisory processor 22 generally receives transactional information from a number of retail point of sale subsystems 20 from plural stores in a retail chain. A master product code list 72 includes valid UPC codes for products sold in all retail stores in the chain. Transaction log file 70 accumulates transactions, typically on a daily basis, for products purchased by consumers at all retail stores. CPU 64 performs retail inventory functions, product code validity testing, and forwarding of transaction log information to the consumer product purchase repository 26 via communications interface/controller 68.

User interfaces 60 and 66 may be used to perform a number of functions relating to inventory control, etc. In addition, various queries and requests of the consumer product purchase repository 26 are formatted and transmitted by a retailer via user interfaces 60 and 66.

FIGURE 4 outlines procedures followed in the consumer applications subsystem 24. Frequent shopper membership applications are completed by consumers at each retail store and collected (block 74). Each consumer who fills out a membership application is assigned a membership identification number (MIN) (block 76). A membership card, e.g. a smart card, is manufactured and issued to a consumer with a corresponding MIN. Optionally, some demographic information obtained from the membership application and specific to that consumer may also be stored on the card. Consumer application information is input and formatted into an appropriate digital form (block 80), and forwarded along with corresponding MINs to the consumer-product purchase repository 26 (block 82).

Typical consumer information includes household demographics where the term demographics refers to names, address (including zip code), ages of members in the household as well as dietary restrictions, number and type of household appliances, income, pet information, and any other characteristic features that may identify particular consumers and particular consumer preferences/needs.

Consumer data and transactional product logs are forwarded to consumer purchase repository subsystem 26 which is essentially a relational database management system (RDBMS). FIGURE 5 provides additional details of exemplary hardware components which may be used to implement consumer product repository 26. CPU 90 is preferably a

32-bit microprocessor such as the 80486 or 80586 manufactured by Intel. The CPU clock speed is preferably at least 33 MHz. CPU 90 is the "engine" which drives and manages a relational database such as that available from ORACLE, via a standard address, data, and control buses 92, including conventional semiconductor and magnetic storage. Random access memory (RAM) 94 receives programs to be executed by CPU 90 and data to be used in program execution. The bulk of the consumer and product information is stored on magnetic storage which include conventional SCSI drives 98A, 98B and tape drive 100. Data are accessed from these drives via a SCSI host adapter 96 which allows the SCSI and tape drive (mass storage media) to be daisy-chain connected to data bus 92. Additional storage is provided via floppy disk drives 104A and 104B which interfaces to data bus 92 by way of a conventional I/O controller 102. These types of storage devices as well as their interface/adapters are conventional and therefore require no additional description.

User interface 106 which includes conventional keyboard, mouse, and display terminal allows a user to store, query, and access information from the relational database. Conventional communications controller/network interface 107 provides the necessary hardware and software links to communicate with other subsystems of the present invention, e.g. consumer application system 24, supervisory processor 22, etc. The network may include the public telephone network accessed by conventional modem or a dedicated ETHERNET™ cable link. The

operating systems software of CPU 90, such as the UNIX™ operating system (OS) incorporates the necessary protocol required for communications over ETHERNET™, e.g. TCP/IP software. Preferably, an ETHERNET™ communications network is used because of greater communications speed and flexibility.

In operation, consumer data are transmitted either by network or via a flat data file from consumer applications system 24 in an appropriate format, e.g. ASCII for storage in the relational database. Similarly, product item list and transaction log file information from the retailer supervisory processor 22 (or from retail point of sale system 20) are received in appropriate data format. CPU 90 stores this data in mass media storage devices 98A, 98B, 100, 104A, and 104B. Before storage, however, and as will be described in further detail below, received data are first organized and substantially reduced using a clustering analysis.

Building database 26, clustering of product and or consumer data, storing data in database 26, updating the database 26, formulating and executing database queries, and performing other analysis of the database 26 are accomplished using conventional database software packages, such as ORACLE™ software. This ORACLE™ software allows a user to both access and view specific data from the database as well as combine specific data in a particular fashion. The ORACLE™ software's primary functions are relational database management. The relational

management database system is the database kernel software that manages the structure of the database and handles database requests and data coming into and going out of the database structure. Structured query programming language (SQL) is used to create, alter and delete database objects (and specific data) from the database structure. SQL software is not particular to ORACLE™ products and is available from other software vendors.

A variety of database development tools well known to those skilled in the art, such as SQL*PLUS™, SQR™, available from SQL Solutions Inc., SQL&Forms™, SQL*MENU™ and PRO*C™ which are available from ORACLE™, may be used by the database programmer to perform various functions and provide various capabilities to the end user (retailer). For example, the SQL* forms and SQL*MENU tools may be used in the present invention to develop a user-friendly interface to the frequent shopper data base. The user-friendly interface allows unfamiliar users to construct requests and queries of the database without having particular expertise with ORACLE™ or SQL software. SQL*PLUS is an interactive SQL command interface that permits a user to query the database as well as add and edit database objects. With this particular tool, a programmer creates one or more "scripts" which are essentially very high level language programs for further simplifying use of the database by an end user like the retailer. PRO*C is another useful tool which precompiles code written in the programming language C which includes SQL statements embedded in the C code to generate executable code. SQR™ is a

procedural reporting tool that has useful query and formatting capabilities.

Specifically, data files of consumer information from consumer applications subsystem 24 or product transactional information from retail POS 20 or retail supervisory processor 22 are read into RAM 94 via communications interface 107. CPU 90 validates and summarizes product transactional information. For each transaction, CPU 90 validates UPC product codes and associated consumer MINs; identifies a product cluster to which particular products in the transaction belong; and identifies a particular consumer cluster to which a consumer identified by MIN belongs. For example, if a consumer purchased a particular brand of soda, that item could be assigned to a cluster defined by the retailer generically as beverages. In the same fashion, a particular brand of cat food would be included in another generic cluster entitled pet foods. After categorizing each product transaction into a product cluster and validating its UPC code, CPU 90 "posts" that cluster information to the relational database.

Posted information for each consumer or product cluster is divided logically into essentially three tables. A first table includes consumer cluster information for each card member. For example, a database table is generated listing in separate columns: consumer MIN, purchase dates, dollar amounts per purchase, discount amount, etc. A second table includes total dollar amounts for a

particular card member for each year. A third table is a consumer history including entries such as the time spent by a particular consumer in each store, the money spent per store visit, any discounts acquired per store visit, etc. In this way, the database stores for each customer MIN transaction purchase dates, amounts, and discounts for various product clusters rather than specific products.

A retailer querying the database may want to determine which customers spend the most money (1) overall, (2) per particular cluster or (3) particular time of year. For example, the following query written in the SQL programming language might be used to access the card numbers of consumers who spend $50 or more on the average visit to the retail store.

```
SELECT CARD_NUMBER FROM HOUSEHOLD_PURCHASE_TOTALS
     WHERE
(TOTAL_PURCHASE_AMOUNT/TOTAL_VISIT_NUMBER) > =50:
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More complex queries can be performed to join the accessed card numbers with the demographics of the consumer's household. Queries may also be made without knowledge of SQL commands by the retailer through the use of predefined scripts employed through menu options. The information resulting from the query can be used, for example, to target those customers with promotional and advertising material directed to products within that cluster.

Similar posting of consumer data from consumer applications may be divided into appropriate tables based on demographic, dietary, appliance, cultural, and other consumer characteristics. By categorizing consumers by characteristics into groups, clusters of "similar" consumers are identified and associated with particular product clusters in response to retailer queries.

Queried information from the frequent shopper database may be communicated to the printer and direct mail subsystem 36 via modem, direct cabling link, or by manually transferring the queried information in a flat file. As a simple example, the queried information can simply be a mailing list retrieved from the frequent shopper database which lists all the people and their addresses who shopped at a particular retail store in the past six months. The printer subsystem 36 would receive this list so that the names and addresses of those consumers could be printed and attached to promotional literature (also printed at the print facility) for direct mailing to those consumers.

At a more comprehensive level, a retailer may desire to promote by coupons, for example, a particular product, e.g. microwave dinners. The frequent shopper database could then be queried by the retailer to extract a report, for example, of all consumers in the database who own a microwave oven. The names and addresses of those consumers would then be used by the printer and direct mail subsystem 36 to print up mailing labels as well as

coupons for the microwave oven dinners and mail that information to the targeted consumers.

The printer and direct mail subsystem 36 is not limited, however, to printing and mailing coupons or advertisements. It may also be used, based on queries extracted from the frequent shopper data base (and optionally on knowledge-based print rules), to print customized promotional information such as newsletters. These newsletters would be of interest to particular consumers targeted based on their statistically determined buying behaviors and their demographics in an effort to interest those consumers in particular retail products.

The clustering technique according to the present invention is illustrated conceptually in FIGURE 6. For example, product clusters could allow a retail grocer to categorize 40,000 to over 60,000 products into any smaller number of product clusters, e.g. 15 to over 100 product clusters. In the same way, a 100,000 to over a 1,000,000 consumers could be summarized into anywhere from 6 to over 100 consumer clusters.

The procedure by which product clusters may be defined follows. The UPC product list is loaded into the relational database by batch entry or by interactive entry (i.e. one at a time by a data entry person). Batch entry may be accomplished by processing a data file in ASCII format that contains the complete list of UPC and product descriptions.

The households that meet this criteria will be selected at execution time based on the demographic information contained in the database. Database queries can be run in the same manner, specifying the criteria that defines a particular consumer cluster.

Exemplary software programs and data structures required for each of the subsystems of the present invention will now be described in terms of various process data flow diagrams and data models. An overall process data flow diagram for the frequent shopper system according to the present invention is illustrated in FIGURE 7. Those of ordinary skill in the art will appreciate that based on the data process flows and data models provided below, queries, data structures, programs, etc. for implementing the present invention may be readily generated. Any suitable language and specific coding for implementing the process flows and data models may be used.

With respect to FIGURE 7, data flow relationships are indicated and labelled by arrows between the various subsystems of the present invention and entities. These relationships define what and how information will be stored in the database. The symbols and flow connections used in FIGURE 7 are described in the table set forth below.

Identifier	Type	Definition
POINT OF SALES SYSTEM	Data Process	Point of sale system functioning within the actual retail outlet environment. Includes scanners, registers, and in-store concentrators.
RETAIL SHOPPER	External Entity	The consumer of the retailer. Each consumer is also associated into a household which is tracked as a single entity.
CONSUMER APPLICATION	Data Process	Subsystem providing a means for capturing information about a store consumer. Consumer characteristic and demographic information entered on an application form and subsequently entered into a data file.
PRINT FACILITIES	External Entity	Site of actual print production and manufacturing that is computer interfaced with a data-stream generated by the database in response to a query.
MARKETING FUNCTION	External Entity	Functional group responsible for the definition of direct marketing programs and products and for the direct support of retailers.

Identifier	Type	Definition
DIRECT MAILING	External Entity	Facility that receives printed promotional and advertising materials and distributes those materials to targeted consumers.
FSDB	Data Store	Main repository for consumer characteristics and transactional purchase history.
CONSUMER PURCHASE REPOSITORY	Data Process	Main repository of consumer information and purchase history. Contains product cluster definition, organizational structure, and other definitional information.
PRINT SYSTEMS ANALYSIS	Data Process	Set of functions driving the format and setup of the final printed product. Analyzes consumer data against defined print product formats to determine resultant printing instructions.
PRINT INTELLIGENCE DATABASE	Data Store	Repository of information describing and defining the relationship between consumer behavior and the format of the printed product.

Identifier	Type	Definition
USER INTERFACE	Data Process	Set of reports, queries, and extracts providing value-added analysis and formatting of information contained in the consumer purchase repository. May function on a both scheduled and as needed basis.
REPOSITORY ADMINISTRATION	Data Process	Facility for the administration of the consumer purchase repository. Provides access to the organizational and structural information in the repository such as product clusters.
RETAILER	External Entity	Retailer business entity.

FLOW CONNECTIONS:

Identifier	Type	Definition
PURCHASE	Data Flow	The actual transaction between a retail grocer and one of their consumers.
DEMOGRAPHIC INFORMATION	Data Flow	Information provided by the retail grocer's consumer on the sign-up application. Includes demographic and psychographic data such as age, number of people in family, income, specific consumer products used in household, etc.

Identifier	Type	Definition
TRANSACTION SESSION	Data Flow	A set of transactions representing the total "check-out" interaction between the retail grocer and one of their consumers at one time. Includes purchases, voids, and all other activity conducted at the POS workstation.
REPOSITORY CHANGES	Data Flow	Updates made by database information administrator to the database via the retailer interface.
CONSUMER PROFILE	Data Flow	The interface to the database containing the consumer demographic and psychographic information aggregated by the consumer application subsystem.
CONSUMER BEHAVIOR SUMMARY	Data Flow	Summarization of consumer household buying behavior.
PRINT SYSTEM INSTRUCTIONS	Data Flow	A set of parameters defining the actions and decisions to be taken by the Print Systems Analysis Subsystem.
CONSUMER PURCHASE EXTRACT	Data Flow	Summarization of consumer household buying behavior based on predefined sets of extract criteria such as consumer cluster definitions.

FIGURE 8 is a data model showing the manner in which data in the frequent shopper database are associated and interrelated. Each of the codes used in FIGURE 8 are defined in the following table:

Identifier	Definition	Description
APPL_CODES	APPLICATION CODES	Coded list of potential appliances a consumer household may own.
DIET_CODES	DIETARY CODES	A coded list of potential dietary requirements for a consumer household.
PROD_VENDOR	PRODUCT VENDOR	The supplier of a product; not necessarily the manufacturer. Includes name and address.
PROMO_CODES	PROMOTION CODES	A coded user classification of promotions with description.
HH_APPL	HOUSEHOLD APPLIANCES	A list of codes indicating the appliances a consumer household claims to own.
HH_DIET	HOUSEHOLD DIETARY REQUIREMENTS	A list of codes indicating the dietary preferences of the consumer household.
PROD_MFR	PRODUCT MANUFACTURER	Name and address of a product's manufacturer.

Identifier	Definition	Description
PROD_PROMO	PRODUCT PROMOTION	A definition of a product promotion, including the start and end dates of the promotion ("flight time"). Also establishes a tracking period to allow for before, during and after sales figures.
HH_PURCH-TOTALS	HOUSEHOLD PURCHASE TOTALS	A cumulative total of a consumer household's purchases.
HH_PROMO_PURCH	HOUSEHOLD PROMOTION PURCHASES	The cumulative amount of a consumer household's purchase on a specific promotion item.
HH_DEMO	HOUSEHOLD DEMOGRAPHICS	Names, addresses, ages, and other demographic features that help uniquely identify the consumer household.
INCOME_CODES	INCOME CODES	A codes list of consumer household income ranges.
HH_CLUSTER_PURCH	HOUSEHOLD CLUSTER PURCHASES	A cumulative total of a specific product cluster associated with the consumer household.
UPC_PRODUCT	UPC PRODUCT	A descriptive definition of a specific product.

Object Identifier	Component Names
HH_DEMO	= CARD_NUM +LAST_NAME +HH_ADDR1 +HH_ADDR2 +HH_CITY +HH_STATE +HH_ZIP +HH_PHONE +MAIL_IND +HH_NUM +CHILD_NUM +CHILD1_BDATE +CHILD2_BDATE +CHILD3_BDATE +CHILD4_BDATE +CHILD5_BDATE +INCOME_CODE +BIRTH_DATE +STORE_ID +DISTRICT_ID
HH_DIET	= CARD_NUM +DIET_CODE
HH_PROMO_PURCH	= CARD_NUM +PROMO_ID +TOT_PROMO_QTY +TOT_DIS_AMT +TOT_PURCH_AMT +PERIOD_START_DATE +PERIOD_END_DATE
HH_PURCH_HISTORY	= CARD_NUM +PURCH_DATE +PURCH_AMT +STORE_ID +DISTRICT_ID

Object Identifier	Component Names
HH_PURCH_TOTALS	= CARD_NUM +TOT_DIS_AMT +TOT_TAX_AMT +TOT_PURCH_AMT +TOT_VISIT_NUM
INCOME CODES	= INCOME_CODE +INC_BEG_AMT +INC_END_AMT +CREATE_DATE +CREATE_USER
PROD_CLUSTER	= CLUSTER_ID +CLUSTER_DESC +CLUSTER_TYPE +STORE_ID +DISTRICT_ID +CREATE_DATE +CREATE_USER
PROD_MFR	= MFR_CODE +VENDOR_ID +MFR_NAME +MFR_ADDR1 +MFR_ADDR2 +MFR_CITY +MFR_STATE +MFR_ZIP +MFR_PHONE

Object Identifier	Component Names
PROD_PROMO	= UPC_CODE +PROMO_ID +PROMO_CODE +PROMO_AMT +START_DATE +END_DATE +TRACK_START_DATE +TRACK_END_DATE +TOT_SOLD_NUM +STORE_ID +DISTRICT_ID +CREATE_DATE +CREATE_USER
PROD_VENDOR	= VENDOR_ID +VEND_NAME +VEND_ADDR1 +VEND_ADDR2 +VEND_CITY +VEND_STATE +VEND_ZIP +VEND_PHONE
PROMO_CODES	= PROMO_CODE +PROMO_DESC +CREATE_DATE +CREATE_USER
STORE_INFO	= STORE_ID +DISTRICT_ID +STORE_NAME +STORE_ADDR1 +STORE_ADDR2 +STORE_CITY +STORE_STATE +STORE_ZIP +STORE_PHONE +STORE_MGR +CREATE_DATE +CREATE_USER

Object Identifier	Component Names
UPC_CLUSTER	= UPC_CODE +DISTRICT_ID +STORE_ID +CLUSTER_ID
UPC_PRODUCT	= UPC_CODE +MFR_CODE +PROD_CODE +PROD_NAME +PROD_DESC +PROD_AMT

The element structure definitions indicating the field length and type of each object identifier are provided in the table below.

Object Identifier	Field Length	Type
APPLIC_DATE	7	DATE
APPL_CODE	2	CHAR
APPL_DESC	30	CHAR
BANK_NAME	30	CHAR
BEG_AGE_DATE	7	DATE
BEG_AGE_NUM		NUMBER
BEG_HH_NUM		NUMBER
BIRTH_DATE	7	DATE
CARD_CODE	2	CHAR
CARD_DESC	30	CHAR
CARD_NUM	16	CHAR
CARD_SEQ_NUM	1	CHAR
CHILD1_BDATE	7	DATE
CHILD2_BDATE	7	DATE
CHILD3_BDATE	7	DATE

Object Identifier	Field Length	Type
CHILD4_BDATE	7	DATE
CHILD5_BDATE	7	DATE
CHILD_NUM		NUMBER
CHK_ACCT_NUM	15	CHAR
CLUSTER_DESC	30	CHAR
CLUSTER_ID	10	CHAR
CLUSTER_TYPE	2	CHAR
CREATE_DATE	7	DATE
CREATE_USER	10	CHAR
DIET_CODE	2	CHAR
DIET_DESC	30	CHAR
DISTRICT_DESC	30	CHAR
DISTRICT_ID	10	CHAR
DRV_LIC_NUM	20	CHAR
DRV_LIC_STATE	2	CHAR
EMPL_ADDR1	30	CHAR
EMPL_ADDR2	30	CHAR
EMPL_CITY	20	CHAR
EMPL_NAME	30	CHAR
EMPL_PHONE	16	CHAR
EMPL_STATE	2	CHAR
EMPL_ZIP	10	CHAR
END_AGE_DATE	7	DATE
END_AGE_NUM		NUMBER
END_DATE	7	DATE
END_HH_NUM		NUMBER
FIRST_NAME	15	CHAR
GROUP_ID	10	CHAR
HH_ADDR1	30	CHAR
HH_ADDR2	30	CHAR

Object Identifier	Field Length	Type
HH_CITY	20	CHAR
HH_NUM		NUMBER
HH_PHONE	16	CHAR
HH_STATE	2	CHAR
HH_ZIP	10	CHAR
INCOME_CODE	2	CHAR
INC_BEG_AMT		NUMBER
INC_END_AMT		NUMBER
ISSUE_DATE	7	DATE
LAST_NAME	20	CHAR
MAIL_IND	1	CHAR
MFR_ADDR1	30	CHAR
MFR_ADDR2	30	CHAR
MFR_CITY	20	CHAR
MFR_CODE	6	CHAR
MFR_NAME	30	CHAR
MFR_PHONE	16	CHAR
MFR_STATE	2	CHAR
MFR_ZIP	10	CHAR
MID_INITIAL	1	CHAR
PERIOD_END_DATE	7	DATE
PERIOD_START_DATE	7	DATE
PROD_AMT	5	NUMBER
PROD_CODE	6	CHAR
PROD_DESC	30	CHAR
PROD_NAME	20	CHAR
PROMO_AMT	5	NUMBER
PROMO_CODE	2	CHAR
PROMO_DESC	30	CHAR

Object Identifier	Field Length	Type
PROMO_ID	10	CHAR
PURCH_AMT	7	NUMBER
PURCH_DATE	7	DATE
PURCH_DATE1	7	DATE
PURCH_DATE2	7	DATE
PURCH_DATE3	7	DATE
PURCH_DATE4	7	DATE
PURCH_DATE5	7	DATE
SOC_SEC_NUM	9	CHAR
START_DATE	7	DATE
STORE_ADDR1	30	CHAR
STORE_ADDR2	30	CHAR
STORE_CITY	20	CHAR
STORE_ID	10	CHAR
STORE_MGR	30	CHAR
STORE_NAME	30	CHAR
STORE_PHONE	16	CHAR
STORE_STATE	2	CHAR
STORE_ZIP	10	CHAR
TOT_CLUS_QTY		NUMBER
TOT_DIS_AMT	9	NUMBER
TOT_PROMO_QTY		NUMBER
TOT_PURCH_AMT	9	NUMBER
TOT_SOLD_NUM		NUMBER
TOT_TAX_AMT	9	NUMBER
TOT_VISIT_NUM		NUMBER
TRACK_END_DATE	7	DATE
TRACK_START_DATE	7	DATE
UPC_CODE	12	CHAR
VENDOR_ID	10	CHAR

Identifier	Type	Definition
LOG ITEM ADJUSTMENTS	Data Process	Receive nonitem purchase scanner data, e.g. coupons, and format for the session log.
AGGREGATE SESSION LOGS	Data Process	Gather and concentrate all session logs accumulated for a time period, e.g. a 24 day. Format to a single data file.
CONCEN-TRATE TRANS-ACTION LOGS	Data Process	Gather all session logs into one transaction log data file.
SESSION LOG	Data Store	

FLOW CONNECTIONS:

Identifier	Type	Definition
PURCHASE	Data Flow	The actual transaction between a Retail Grocer and one of their consumers.
TRANSACTION SESSION	Data Flow	A set of transactions representing the total "check-out" interaction between the Retail Grocer and one of their consumers at one time. Includes purchases, voids, and all other activity conducted at the POS workstation.

Identifier	Type	Definition
CONSUMER CARD DATA	Data Flow	Information scanned from consumer membership card. Usually just the card member number.
CONSUMER ID	Data Flow	The card member number (MIN) originating from the consumer membership card.
ITEM PURCHASE	Data Flow	Information related to a purchased item such as an item number, selling price, and quantity.
ITEM LOG	Data Flow	A consumer's item purchase represented in the session log.
ITEM ADJUSTMENTS	Data Flow	Consumer transactions other than an item purchase, such as voids, coupons, etc.
ADJUSTMENT LOG	Data Flow	A nonitem purchase transaction represented in the session log.
SESSION ITEMS	Data Flow	Each unit of a session log representing product purchase and other transactions.
SESSION GROUP	Data Flow	All sessions within a logical grouping such as for a given store over a day or week. Generally sorted by POS terminal and time.
TRANS LOG GROUP	Data Flow	Group of Session Groups usually for a given store over a day or week. Exists as a data file.

The consumer application system software is outlined in the data flow diagram of Figure 10. The definition of each symbol identifier and each flow connection is provided in the table set forth below.

Identifier	Type	Definition
RECORD CARD MEMBER INFORMATION	Data Process	Enter consumer identifying, demographic, and psychographic data from the sign-up application subsystem into database.
CONSUMER APPLICATIONS	Data Store	Data entry repository for new consumer applicant's data.
COMPLETE CARD APPLICATION	Data Process	The consumer, along with store assistant completes the sign-up application and assigns unique MIN.
CARD MANUFACTURER	External Entity	The facility that produces the physical card and mailer to provide the consumer with the membership package.
PRODUCE CARD	Data Process	Extract the information required to produce and deliver consumer a membership card.

Identifier	Type	Definition
CONSUMER INFORMATION	Data Flow	Consumer sign-up information data as required by the entry process to the consumer applications subsystem.
DEMOGRAPHIC INFORMATION	Data Flow	Information provided by the Retailer's consumer on the sign-up application. Includes demographic and psychographic data.

FIGURE 11 shows a process data flow for transactions with the consumer product purchase repository. Definitions for the symbol and flow connection identifiers are provided in the table below.

Identifier	Type	Definition
RETAILER	External Entity	Retailer business entity.
VALIDATE TRANSACTION	Data Process	Receive transaction session log from POS system and validate the session.
PENDING TRANS LOG	Data Store	Transaction log session that is invalid. Held for correction, then released for posting.

Identifier	Type	Definition
CORRECT ERRORS	Data Process	Make necessary corrections to rejected transaction log session. Usually a problem with consumer card number.
POST CONSUMER PURCHASES	Data Process	Scan valid transaction log session, determine product cluster purchases and post to database.
ADD NEW CONSUMER	Data Process	Accept new application consumer information from consumer application subsystem and add to database.
FREQUENT SHOPPER DATA BASE	Data Store	Main repository for consumer characteristics and product purchase history. Relational database serving as repository for consumer and product information.
EXTRACT CONSUMER CLUSTER SUMMARY	Data Process	Extracts information required by the print analysis subsystem.

FLOW CONNECTIONS:

Identifier	Type
INVALID TRANS LOG SESSION	Data Flow
VALID TRANS LOG SESSION	Data Flow
TRANSACTION SESSION	Data Flow

Identifier	Type
VALID CARD NUMBER	Data Flow
CONSUMER PROFILE	Data Flow
CONSUMER BEHAVIOR SUMMARY	Data Flow
PROD CLUSTER PURCHASE	Data Flow
PENDING TRANS LOG SESSION	Data Flow
CORRECTED TRANS LOG SESSION	Data Flow
VALID UPC	Data Flow
TRANS LOG ERRORS	Data Flow
NEW CONSUMER	Data Flow
CONSUMER CLUSTER SUMMARY	Data Flow

FIGURES 12(a) - 12(i) are self-explanatory illustrating various kinds of repository administration reports, activities, and functions that may be performed using the present invention.

A process flow diagram for user interface between a retailer and the frequent shopper database is illustrated in FIGURE 13. Definitions of the symbols and flow connections are provided in the table set forth below.

Definition	Identifier	Type
RETAILER	External Entity	Retailer business entity.
EVALUATE QUERY	Data Process	Parse, analyze, and format query request from user.
FORMAT QUERY	Data Process	Receives resultant data from query and presents to user.
EXECUTE QUERY	Data Process	Takes query criteria and accesses database for required information.
FREQUENT SHOPPER DATABASE	Data Store	Main repository for consumer characteristics and product purchase history.

FLOW CONNECTIONS:

Identifier	Type
CONSUMER MARKETING INFORMATION -- QUERY	Data Flow

Identifier	Type
QUERY SELECTION CRITERIA	Data Flow
QUERY REPORT	Data Flow
RESOLVED QUERY CRITERIA	Data Flow
RESULTANT QUERY	Data Flow

While the invention has been described in connection with what is presently considered to be the most practical and preferred embodiment, it is to be understood that the invention is not to be limited to the disclosed embodiment, but on the contrary, is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the appended claims. Moreover, while various examples have been described in the retail grocery context, the present invention may be employed in any retail, wholesale, or consumer service or sales environment.

5. The method according to claim 4, further comprising:

querying said database based on selected criteria;

accumulating product cluster data from said database based on said query; and

outputting said accumulated data.

6. The method according to claim 4, further comprising:

modifying said database based on changing market conditions, and

querying said modified database to extract specific consumer buying patterns, habits, demographics, cultural backgrounds, or other personal characteristics.

7. The method according to claim 1, wherein said grouping step includes:

assigning product codes to a corresponding product cluster, and

summarizing product transactional data using corresponding product cluster information.

8. The method according to claim 1, wherein said analyzing step includes:

determining characteristics of consumers purchasing products included in particular product clusters.

9. The method according to claim 1, further comprising:

receiving consumer information describing characteristics of said consumers;

grouping said consumers into consumer clusters based on particular consumer characteristics;

analyzing transactions in terms of said consumer clusters to determine relationships between said consumers and said products.

10. The method according to claim 1, said analyzing step further comprising:

analyzing product promotions using product cluster transactional information.

11. The method according to claim 3, further comprising:

determining the content of said marketing or advertising materials based on said buying habits;

printing said marketing or advertising materials relating to particular products; and

distributing said printed materials to said specific consumers.

12. A method for processing transactional information involving a plurality of consumers conducting purchase transactions of particular products, comprising:

receiving consumer information describing particular characteristics of said consumers;

grouping said consumers into consumer clusters based on selected characteristics; and

analyzing purchase transactions made by said consumers in terms of said consumer clusters to determine relationships between said consumers and said products.

13. The method according to claim 12, wherein the number of consumers is substantially larger than the number of consumer clusters.

14. The method according to claim 12, wherein transactional data is stored and analyzed in terms of clusters.

15. The method according to claim 12, further comprising:

adapting the content of marketing or advertising materials relating to particular products based on consumer cluster information; and

printing said marketing or advertising materials; and

distributing said printed materials to specific consumers.

16. The method according to claim 12, further comprising:

modifying said selected characteristics defining consumer clusters without changing said received consumer characteristics information.

17. The method according to claim 12, wherein said consumer characteristics include consumer demographics, income ranges, household appliances, or dietary restrictions.

18. The method according to claim 12, further comprising:

grouping products into product clusters;

maintaining a relational database for storing transactional, consumer cluster, and product cluster information; and

determining purchasing behaviors of consumers based on queries to said database.

19. A method for monitoring promotional and advertising efforts, comprising:

generating a product database associating each product of a plurality of related products into a product cluster;

generating a consumer database associating each of plural consumers into consumer clusters based on selected consumer characteristics;

monitoring sales of a particular product for a predetermined time period;

initiating a promotional campaign for said particular product during said time period; and

analyzing said promotional campaign after said time period based on product transaction and cluster information.

20. A method for processing retail transactional information involving plural products and consumers, comprising:

receiving product information uniquely identifying a specific product;

grouping said product information into generic product categories;

receiving consumer information describing demographic characteristics of said consumers;

grouping said consumers into consumer categories based on selected characteristics;

analyzing transactions in terms of the product and consumer categories to determine relationships between said consumers and said products;

printing promotional literature directed to particular consumers based on said relationships; and

directly mailing said promotional literature to said particular consumers.

21. The method according to claim 20, further comprising:

storing said transactional information in a database, and

updating said database with current transactional, product, and consumer information.

22. A system for optimizing retail marketing operations based on purchase transactions of consumer products, comprising:

a relational database;

means for receiving consumer identifying data and product purchase transactional data;

means for grouping said data into clusters of information based on predefined criteria;

means for storing said cluster information in said database; and

means for analyzing said stored cluster information to determine buying behaviors of consumers.

23. The system according to claim 22, further comprising:

point of sale terminals for recording consumer purchase transactions including transmission means for transmitting transactional information from said point of sale terminals to said means for receiving.

24. The system according to claim 23, wherein said point of sale terminals include code readers for detecting coded consumer and product information.

25. The system according to claim 23, wherein said code readers optically detect said coded information.

26. The system according to claim 23, wherein said point of sale terminals are remotely located at retail sales stores, said system further comprising:

a supervisory retail processor for receiving transactional data from plural point of sales terminals including:

memory for storing a master product list containing valid product codes;

means for checking product codes included in said transactional data against said master product list to ensure valid product codes; and

means, connected to said means for checking, for transmitting validated transactional data and a list of product codes determined not to be on said master product list to said receiving means.

27. The system according to claim 22, further including a user interface terminal for allowing a retailer to query information from said database.

28. The system according to claim 27, wherein said queries relate to purchasing behaviors of consumers, promotional efforts for particular products, or common characteristics of consumers purchasing particular products.

29. The system according to claim 20, wherein said means for grouping includes:

means for associating said consumer identifying data into a plurality of consumer clusters based on predefined consumer criteria, and

means for assigning said products into product clusters based on predefined product criteria.

30. The system according to claim 29, wherein said analyzing means analyzes said consumer product cluster information to determine buying behaviors of consumers.

31. The system according to claim 22, further comprising:

means for gathering consumer demographics data;

means for encoding said consumer demographics data into digital format; and

means for providing said encoded consumer data to said receiving means.

32. The system according to claim 31, wherein said consumer identifying data includes consumer

demographics, income ranges, product preferences, or other consumer characteristics.

33. The system according to claim 31, wherein membership cards are issued to consumers which include a coded identifier for uniquely identifying a consumer and identifying data associated with that consumer.

34. The system according to claim 33, wherein a dynamic memory and a microprocessor are included on said membership cards for storing consumer identification data and for restricting access to that identification data.

35. The system according to claim 33, further comprising:

point of sale terminals remotely located at retail stores for detecting a consumer coded identifier and associating that identifier with products purchased by that consumer.

36. The system according to claim 22, further comprising:

printing means connected to said analyzing means for printing customized promotional information directed to particular consumers based on said cluster information.

37. The system according to claim 36, wherein said printing means includes:

means for storing packages of print information, each package having different contents relating to consumer products, and

means for selecting certain ones of said print packages to be included in said customized promotional information based on cluster information.

38. The system according to claim 36, wherein said promotional literature includes advertisements and the content and layout of said advertisements are selected for particular consumers.

39. The system according to claim 36, wherein said promotional literature includes newsletters and the content and layout of said newsletters are selected for particular consumers.

40. The system according to claim 36, wherein said promotional literature includes coupons selected for particular consumers.

41. The system according to claim 36, further comprising:

means for directly mailing said customized information only to said particular consumers based on said particular consumers' demographics and buying behaviors.

41. A system for processing transactional information involving plural consumer products and consumers, comprising:

means for receiving product information identifying a specific product;

means for grouping said product information into product clusters; and

means for analyzing product transactions made by said consumers using said product clusters to determine relationships between said consumers and said products.

42. The system according to claim 41, further including:

means for determining buying habits of said consumers according to said relationships, and

means for targeting specific ones of said consumers with marketing or other promotional literature based on said buying habits.

43. The system according to claim 41, wherein said means for receiving includes a relational database for storing transactional, product cluster, and consumer demographics information, said system further comprising:

means for determining purchasing behaviors of consumers using the information in said database.

44. The system according to claim 43, further comprising:

a user interface for querying said database based on selected criteria, wherein said means for analyzing includes means for accumulating product cluster data from said database based on a user-generated query and means for outputting said accumulated data.

45. The system according to claim 43, further comprising:

means for modifying said database based on changing market conditions and querying said modified database to extract specific consumer buying patterns, habits, demographics, cultural backgrounds, or other personal characteristics.

46. The system according to claim 41, wherein said means for analyzing includes:

means for determining characteristics of consumers purchasing products included in particular product clusters.

47. The system according to claim 41, wherein said means for receiving receives consumer information describing characteristics of said consumers, said means for grouping groups of said consumers into consumer clusters based on particular consumer characteristics, and said means for analyzing analyses transactions in terms of said consumer clusters to determine relationships between said consumers and said products.

48. A system for processing retail transactional information involving plural products and consumers, comprising:

a product database associating products of a plurality of related products into a product cluster;

a consumer database associating consumers into consumer clusters based on selected consumer characteristics;

means for analyzing transactions using the product and consumer clusters to determine relationships between said consumers and said products;

a printer for printing promotional literature directed to particular consumers based on said relationships; and

means for directly mailing said promotional literature to said particular consumers.

DATED this 21st day of February 1994.

MOORE BUSINESS FORMS, INC.

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ABSTRACT OF THE DISCLOSURE

A method and system for gathering and analyzing customer and purchasing information permits a retailer or retail chain to process transactional information involving large numbers of consumers and consumer products. Product information is gathered that uniquely identifies a specific product by type and manufacturer and grouped into generic product clusters. Consumers are similarly grouped into consumer clusters based on common consumer demographics and other characteristics. Consumer retail transactions are analyzed in terms of product and/or consumer clusters to determine relationships between the consumers and the products. Product, consumer, and transactional data are maintained in a relational database. Targeting of specific consumers with marketing and other promotional literature is based on consumer buying habits, needs, demographics, etc. A retailer queries the database using selected criteria, accumulates data from the database in response to that query, and makes prudent business and marketing decisions based on that response. Queried information from the database may be communicated to a printing subsystem for printing promotional literature directed to particular customers based on cluster information stored in the database.

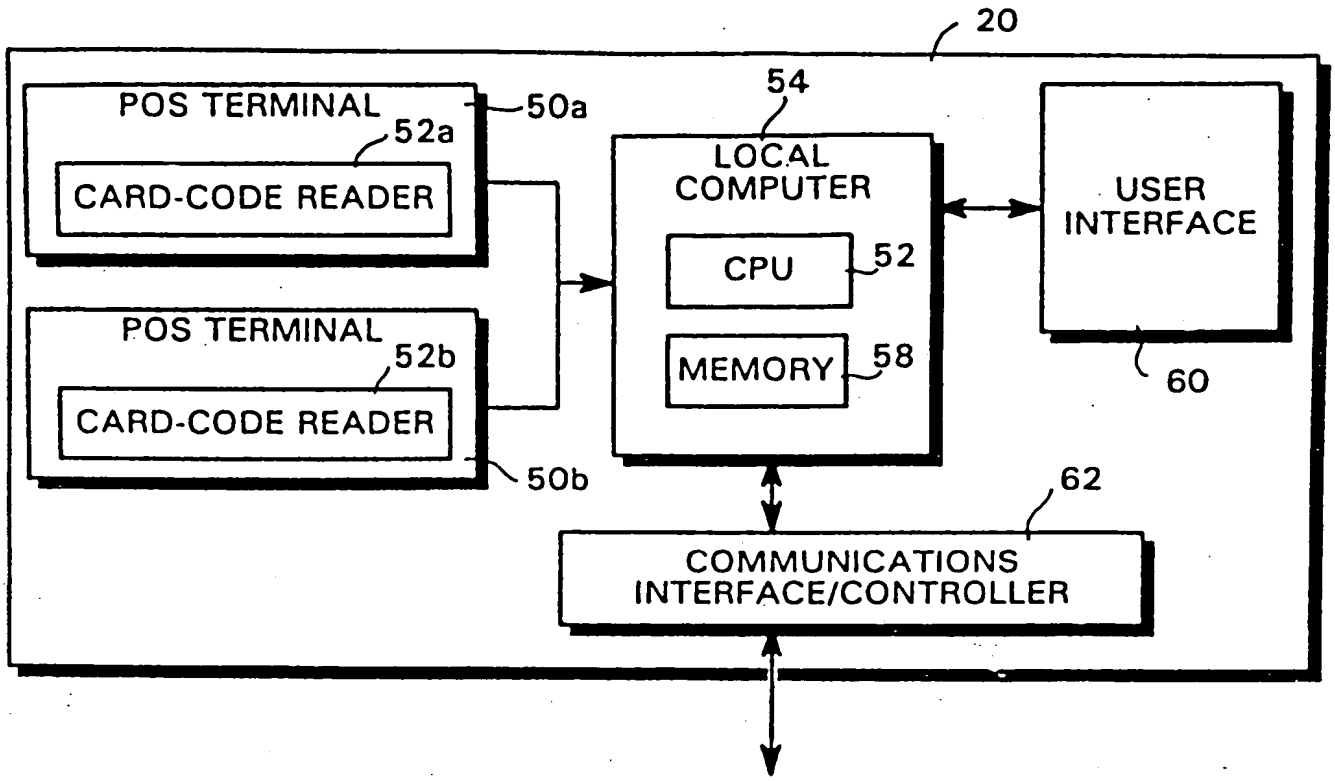

20
POS TERMINAL
50a
52a
CARD-CODE READER
POS TERMINAL
52b
CARD-CODE READER
50b
54
LOCAL COMPUTER
CPU
52
MEMORY
58
USER INTERFACE
60
62
COMMUNICATIONS INTERFACE/CONTROLLER

FIG. 2

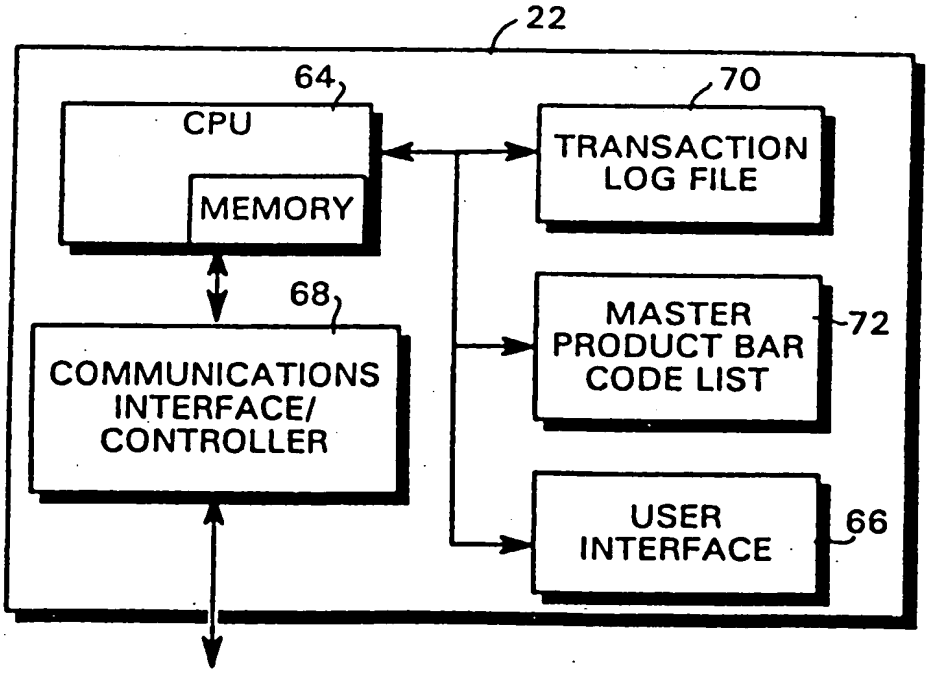

22
64
CPU
MEMORY
68
COMMUNICATIONS INTERFACE/ CONTROLLER
70
TRANSACTION LOG FILE
MASTER PRODUCT BAR CODE LIST
72
USER INTERFACE
66

FIG. 3

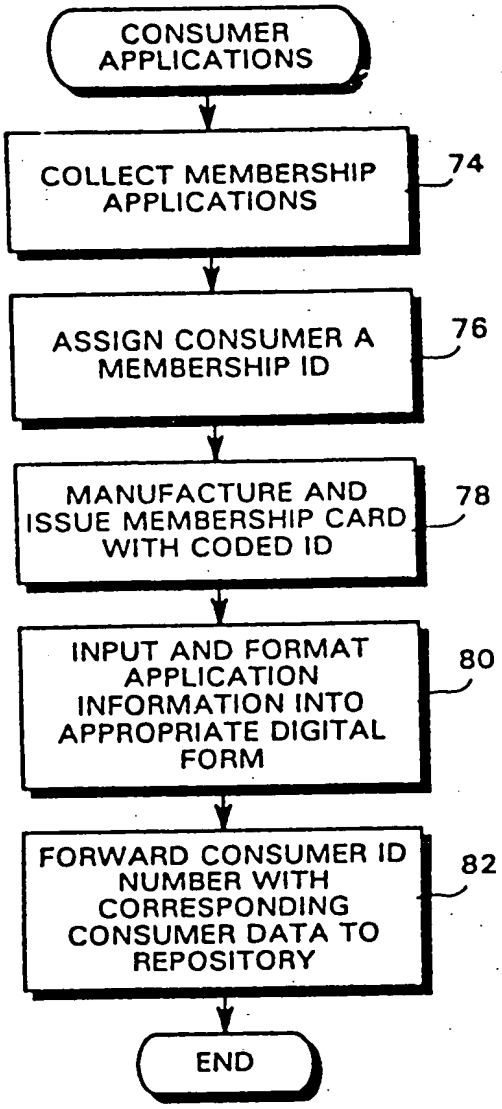
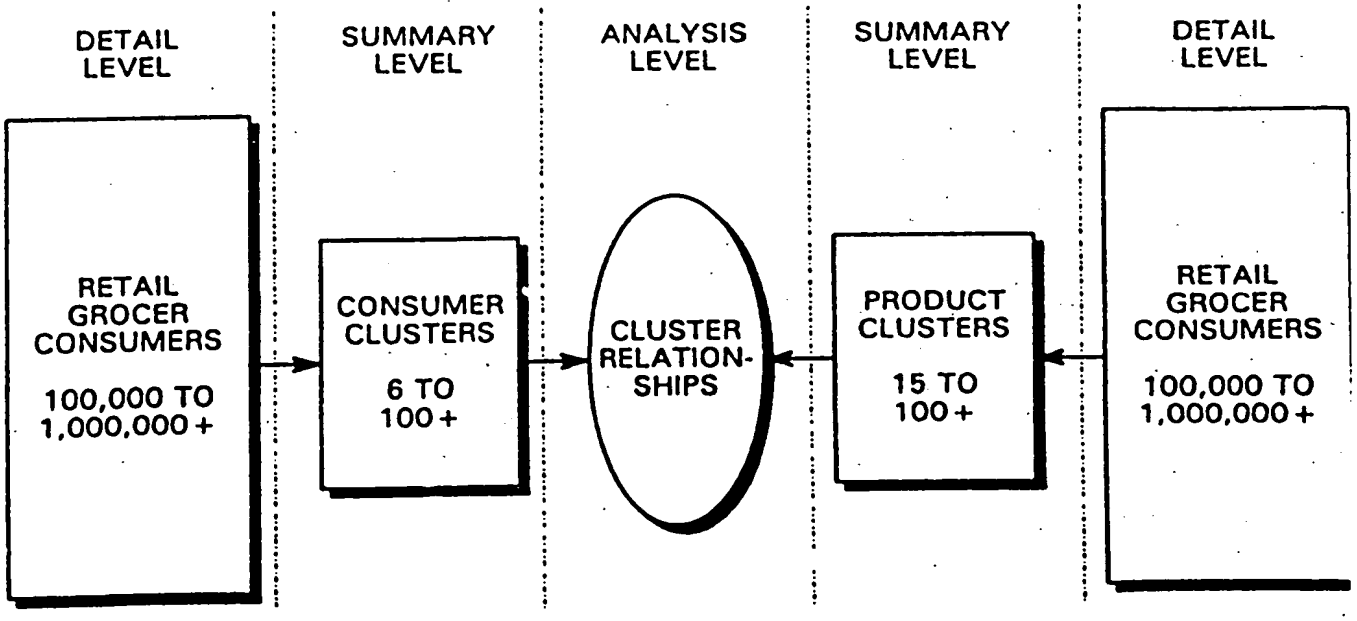


FIG. 4

FIG. 6 CLUSTER CONCEPT



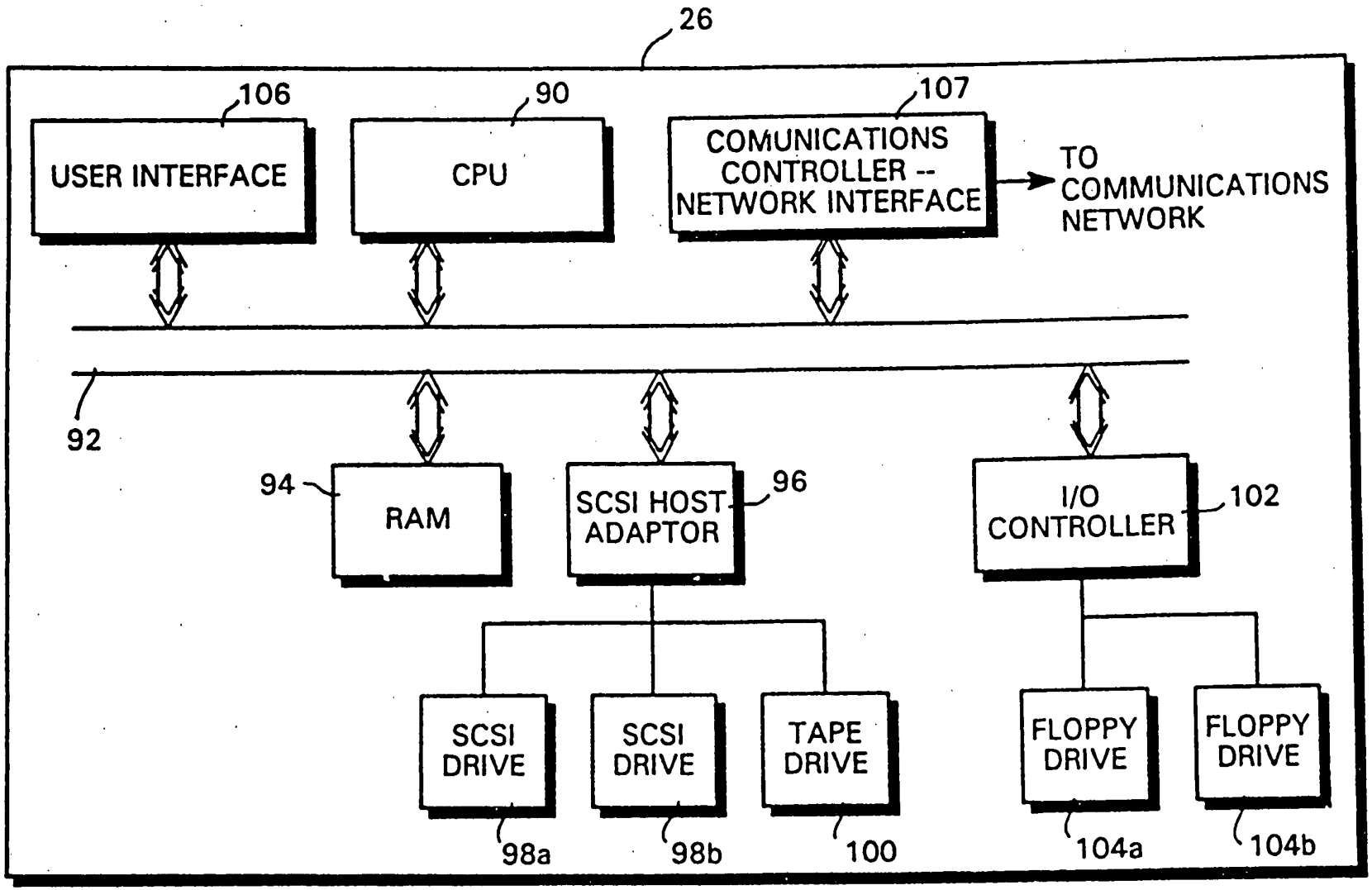

26
106
USER INTERFACE
90
CPU
107
COMUNICATIONS CONTROLLER -- NETWORK INTERFACE
TO COMMUNICATIONS NETWORK
92
94
RAM
SCSI HOST ADAPTOR
96
I/O CONTROLLER
102
SCSI DRIVE
SCSI DRIVE
TAPE DRIVE
FLOPPY DRIVE
FLOPPY DRIVE
98a
98b
100
104a
104b

FIG. 5

FIG. 7

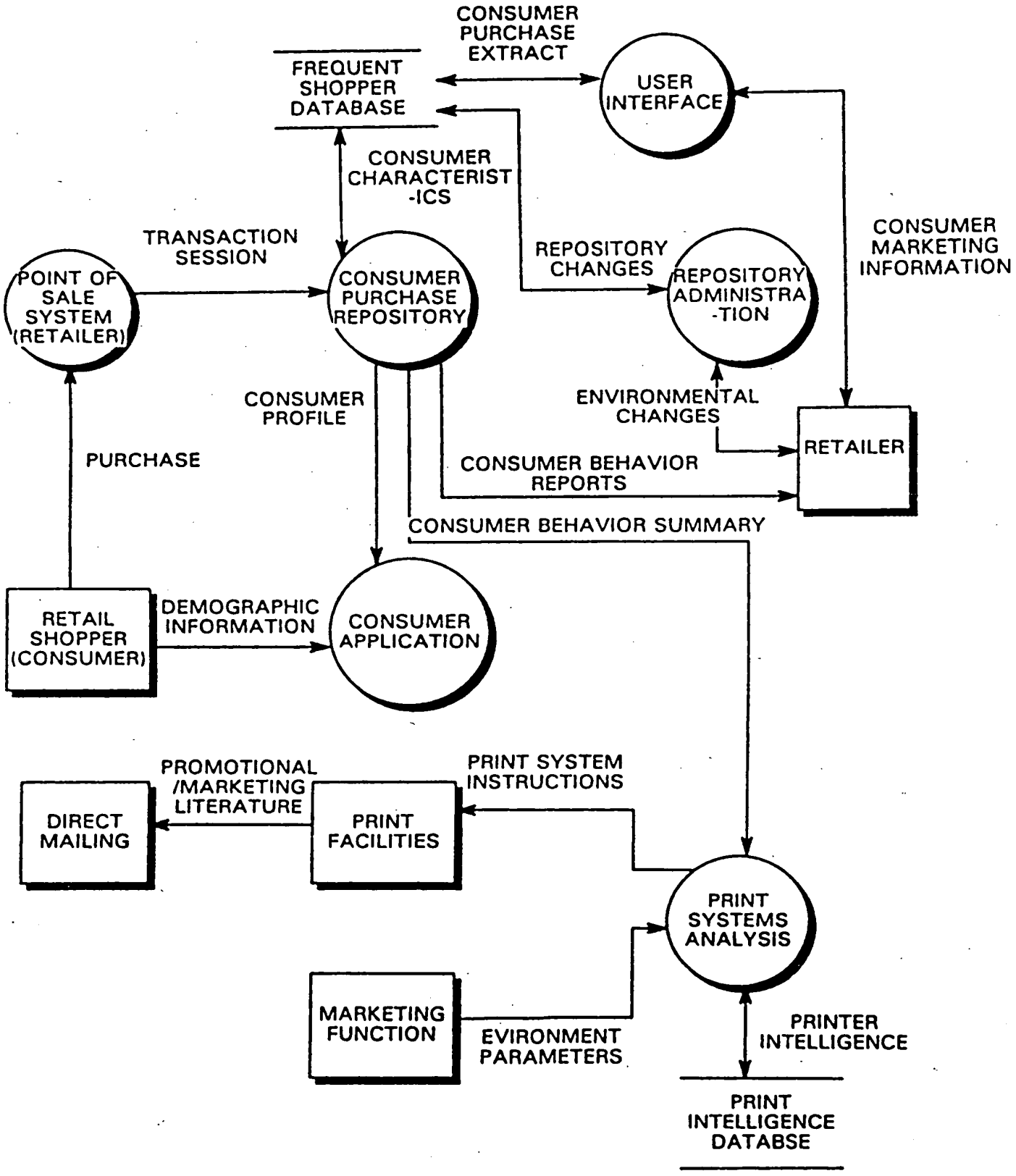

CONSUMER PURCHASE EXTRACT
FREQUENT SHOPPER DATABASE
USER INTERFACE
CONSUMER CHARACTERIST -ICS
TRANSACTION SESSION
REPOSITORY CHANGES
CONSUMER MARKETING INFORMATION
POINT OF SALE SYSTEM (RETAILER)
CONSUMER PURCHASE REPOSITORY
REPOSITORY ADMINISTRA -TION
CONSUMER PROFILE
ENVIRONMENTAL CHANGES
PURCHASE
RETAILER
CONSUMER BEHAVIOR REPORTS
CONSUMER BEHAVIOR SUMMARY
RETAIL SHOPPER (CONSUMER)
DEMOGRAPHIC INFORMATION
CONSUMER APPLICATION
PROMOTIONAL /MARKETING LITERATURE
PRINT SYSTEM INSTRUCTIONS
DIRECT MAILING
PRINT FACILITIES
PRINT SYSTEMS ANALYSIS
MARKETING FUNCTION
EVIRONMENT PARAMETERS
PRINTER INTELLIGENCE
PRINT INTELLIGENCE DATABSE

FIG. 8

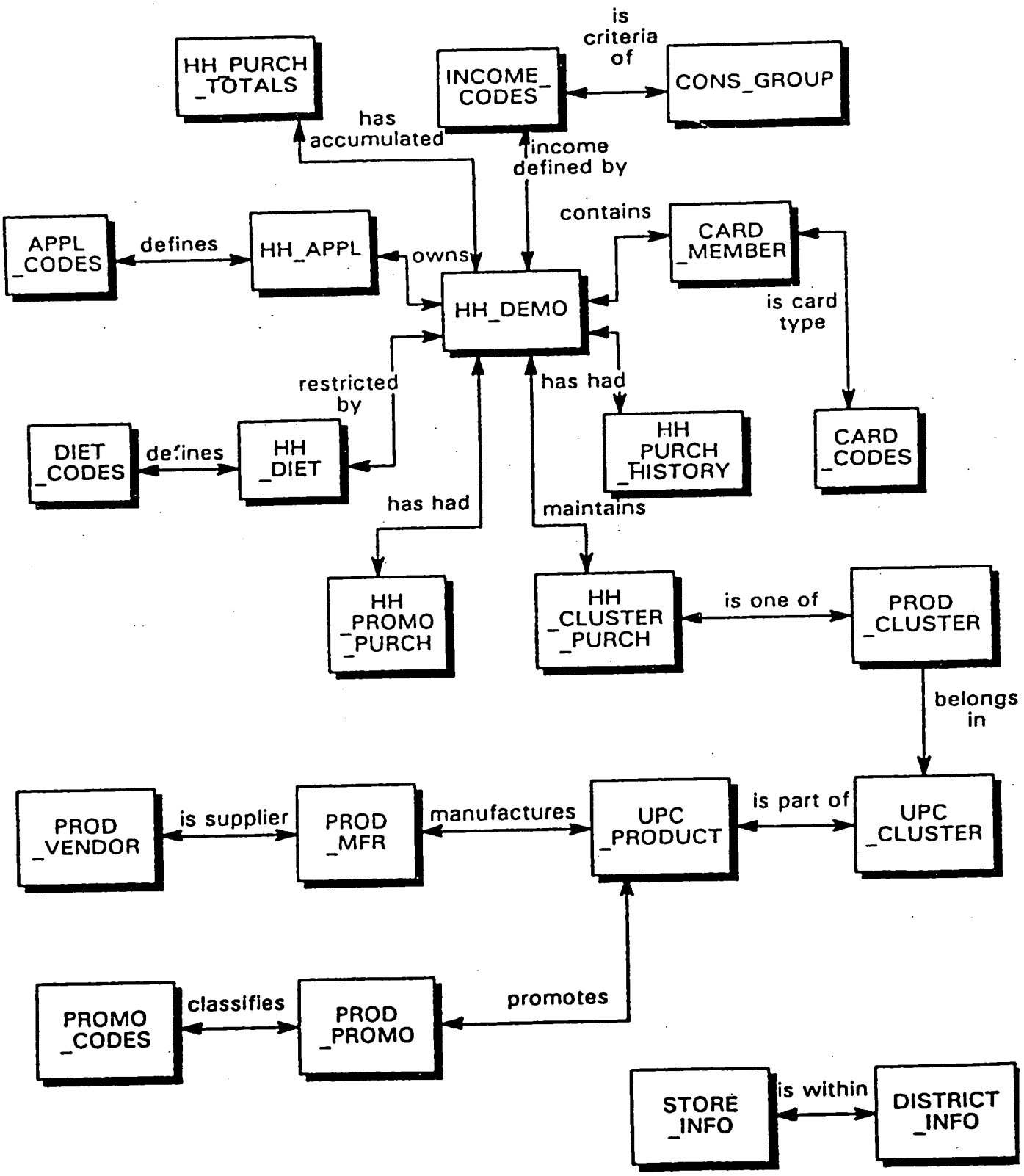

HH_PURCH_TOTALS
INCOME_CODES
is criteria of
CONS_GROUP
has accumulated
income defined by
APPL_CODES
defines
HH_APPL
owns
HH_DEMO
contains
CARD_MEMBER
is card type
restricted by
has had
DIET_CODES
defines
HH_DIET
HH PURCH_HISTORY
CARD_CODES
has had
maintains
HH_PROMO_PURCH
HH_CLUSTER_PURCH
is one of
PROD_CLUSTER
belongs in
PROD_VENDOR
is supplier
PROD_MFR
manufactures
UPC_PRODUCT
is part of
UPC_CLUSTER
PROMO_CODES
classifies
PROD_PROMO
promotes
STORE_INFO
is within
DISTRICT_INFO

FIG. 9

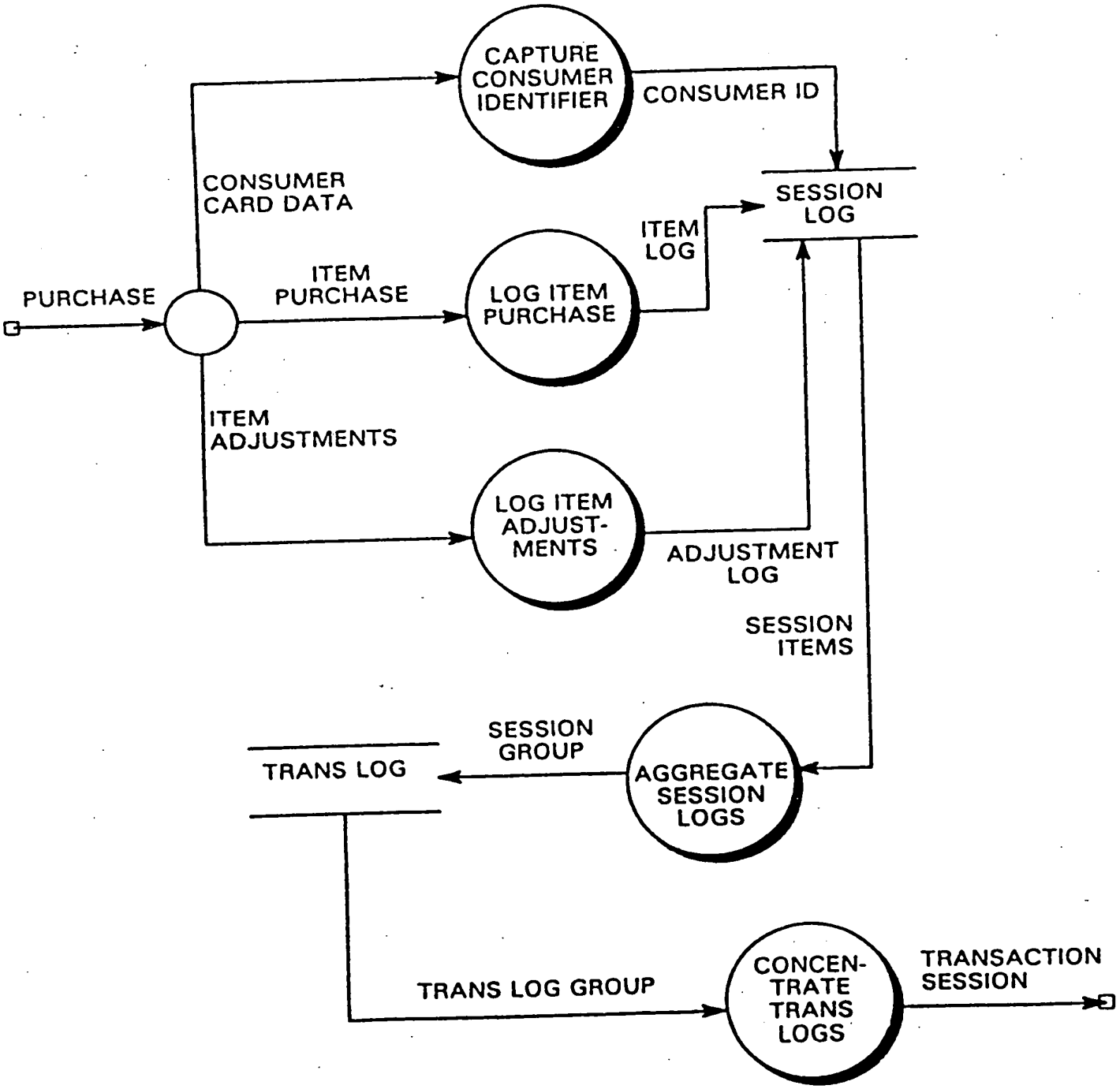

CAPTURE CONSUMER IDENTIFIER
CONSUMER ID
CONSUMER CARD DATA
SESSION LOG
ITEM LOG
PURCHASE
ITEM PURCHASE
LOG ITEM PURCHASE
ITEM ADJUSTMENTS
LOG ITEM ADJUST-MENTS
ADJUSTMENT LOG
SESSION ITEMS
SESSION GROUP
TRANS LOG
AGGREGATE SESSION LOGS
TRANS LOG GROUP
CONCEN-TRATE TRANS LOGS
TRANSACTION SESSION

FIG. 10

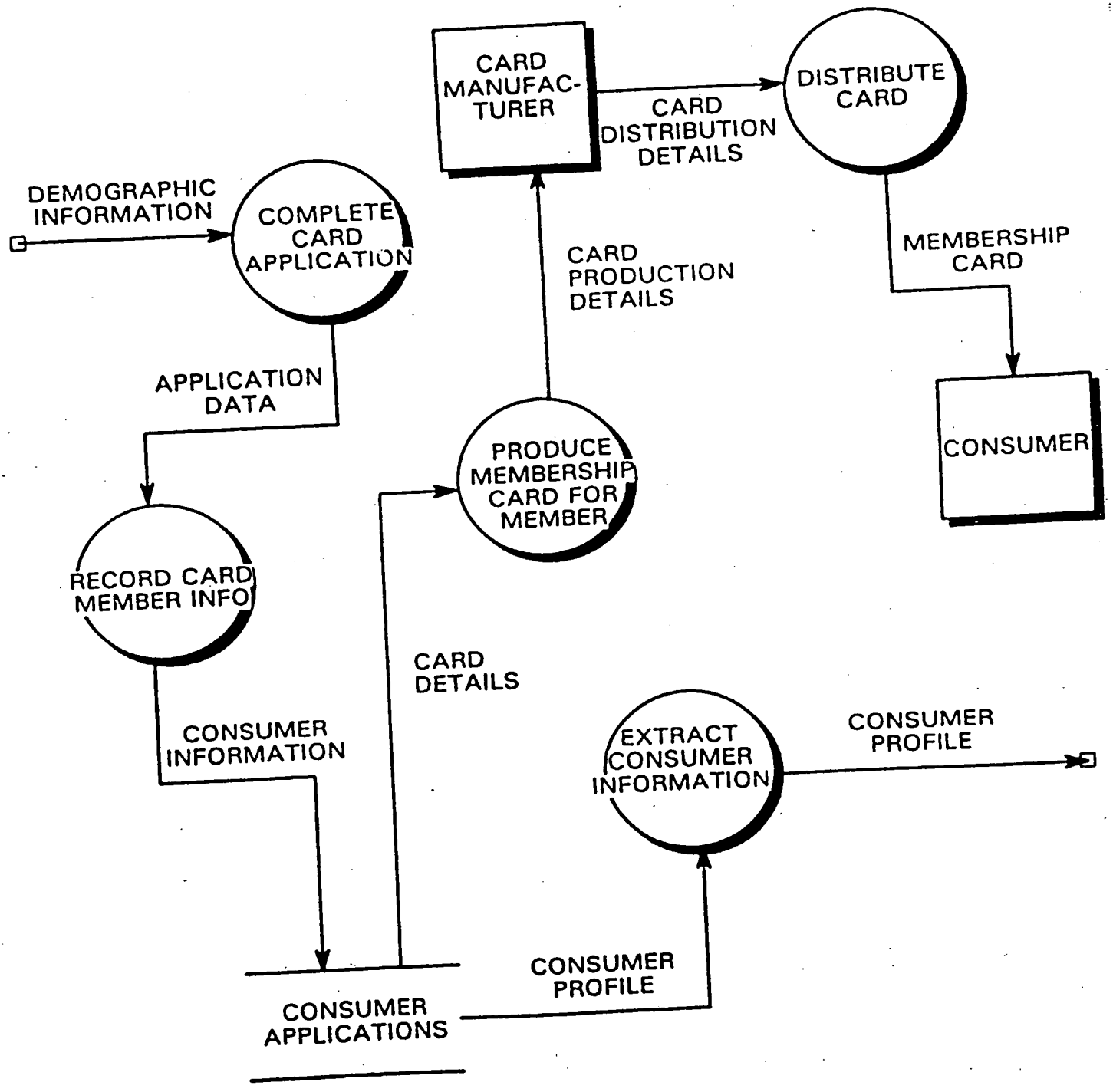

CARD MANUFAC-TURER
CARD DISTRIBUTION DETAILS
DISTRIBUTE CARD
DEMOGRAPHIC INFORMATION
COMPLETE CARD APPLICATION
CARD PRODUCTION DETAILS
MEMBERSHIP CARD
APPLICATION DATA
PRODUCE MEMBERSHIP CARD FOR MEMBER
CONSUMER
RECORD CARD MEMBER INFO
CARD DETAILS
CONSUMER INFORMATION
EXTRACT CONSUMER INFORMATION
CONSUMER PROFILE
CONSUMER PROFILE
CONSUMER APPLICATIONS

FIG. 11

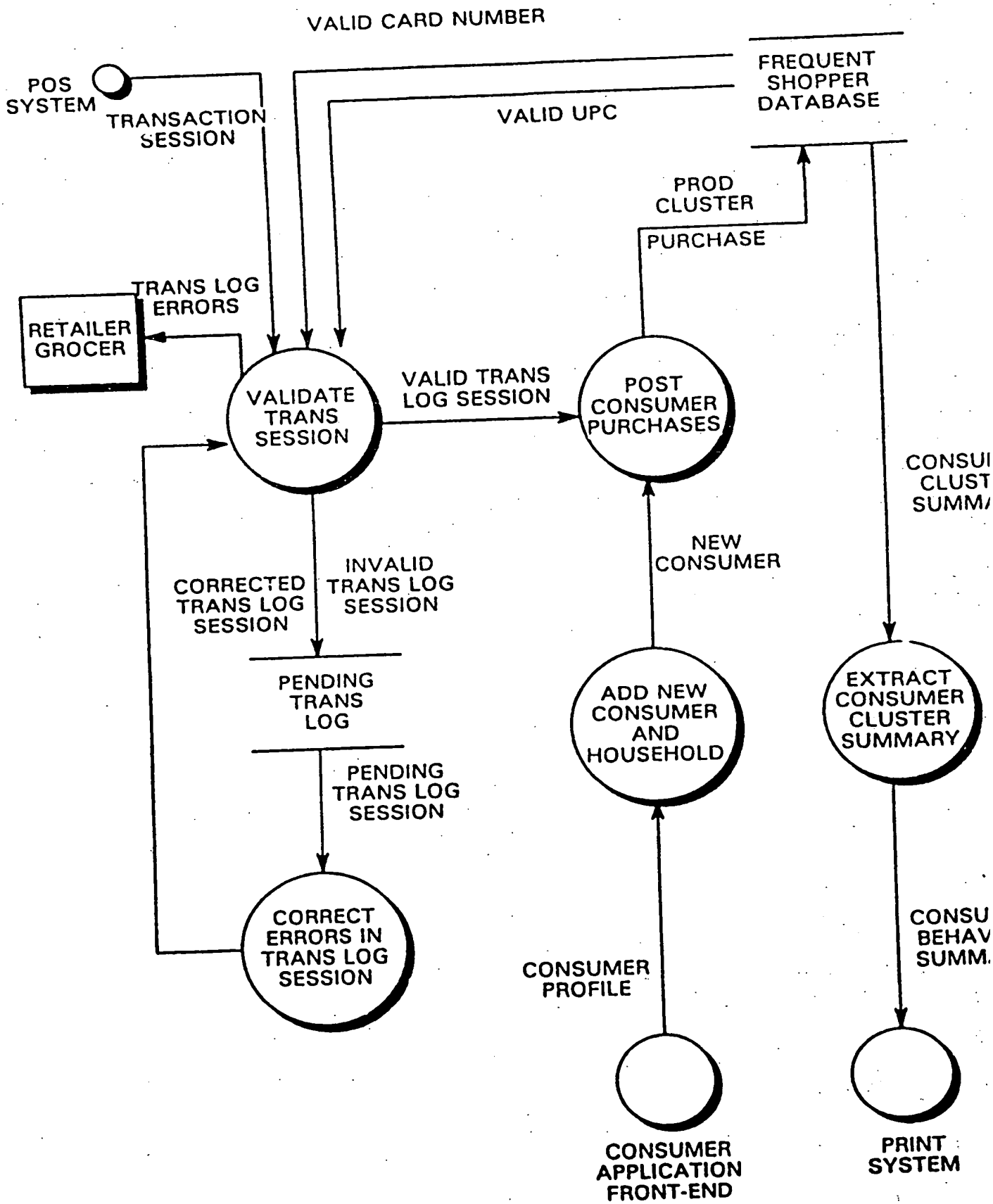
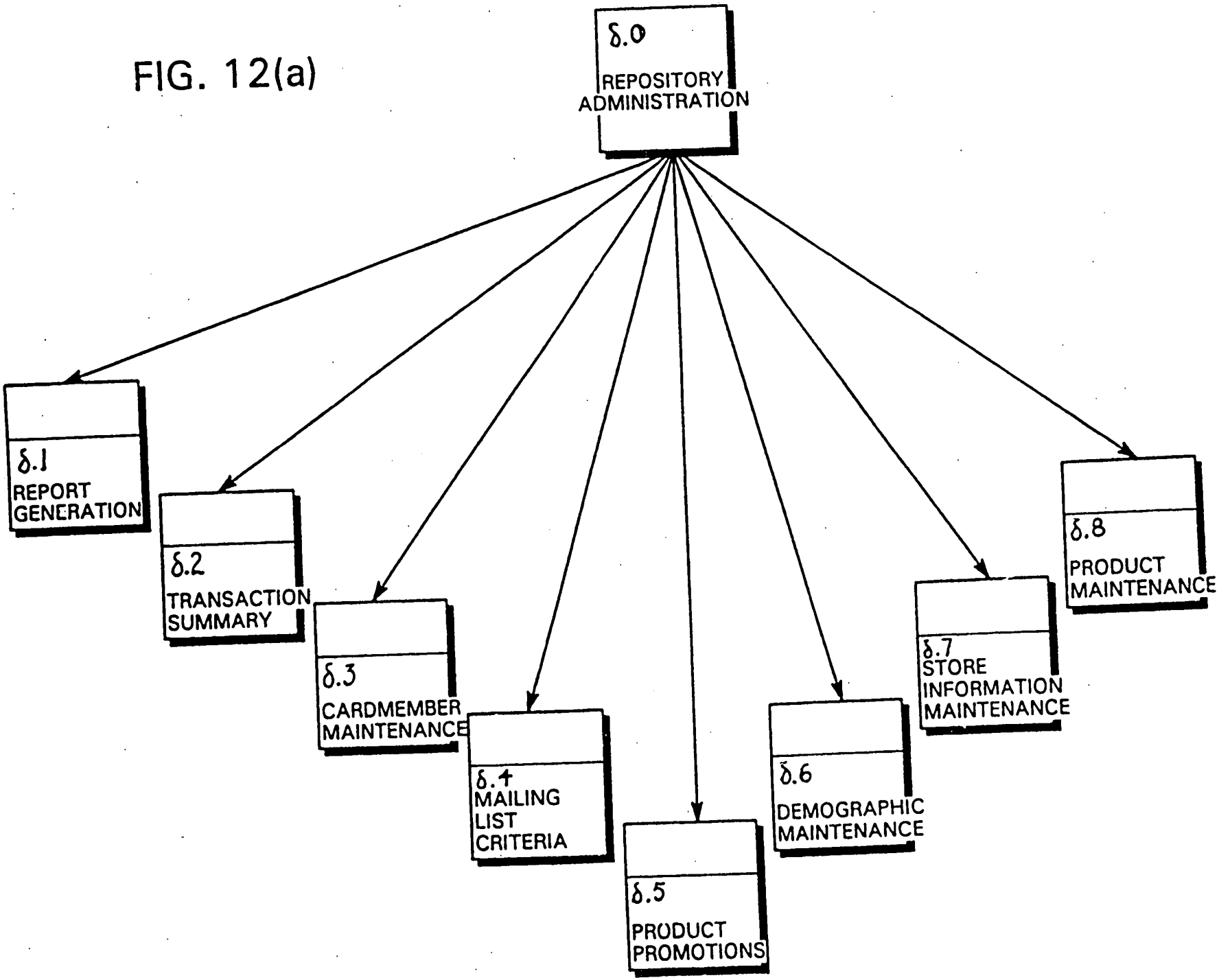

VALID CARD NUMBER
POS SYSTEM
TRANSACTION SESSION
VALID UPC
FREQUENT SHOPPER DATABASE
PROD CLUSTER
PURCHASE
TRANS LOG ERRORS
RETAILER GROCER
VALIDATE TRANS SESSION
VALID TRANS LOG SESSION
POST CONSUMER PURCHASES
CONSUI CLUST SUMM
NEW CONSUMER
CORRECTED TRANS LOG SESSION
INVALID TRANS LOG SESSION
PENDING TRANS LOG
PENDING TRANS LOG SESSION
ADD NEW CONSUMER AND HOUSEHOLD
EXTRACT CONSUMER CLUSTER SUMMARY
CORRECT ERRORS IN TRANS LOG SESSION
CONSUMER PROFILE
CONSU BEHAV SUMM
CONSUMER APPLICATION FRONT-END
PRINT SYSTEM

FIG. 12(a)


δ.0
REPOSITORY ADMINISTRATION
δ.1
REPORT GENERATION
δ.2
TRANSACTION SUMMARY
δ.3
CARDMEMBER MAINTENANCE
δ.4
MAILING LIST CRITERIA
δ.5
PRODUCT PROMOTIONS
δ.6
DEMOGRAPHIC MAINTENANCE
δ.7
STORE INFORMATION MAINTENANCE
δ.8
PRODUCT MAINTENANCE

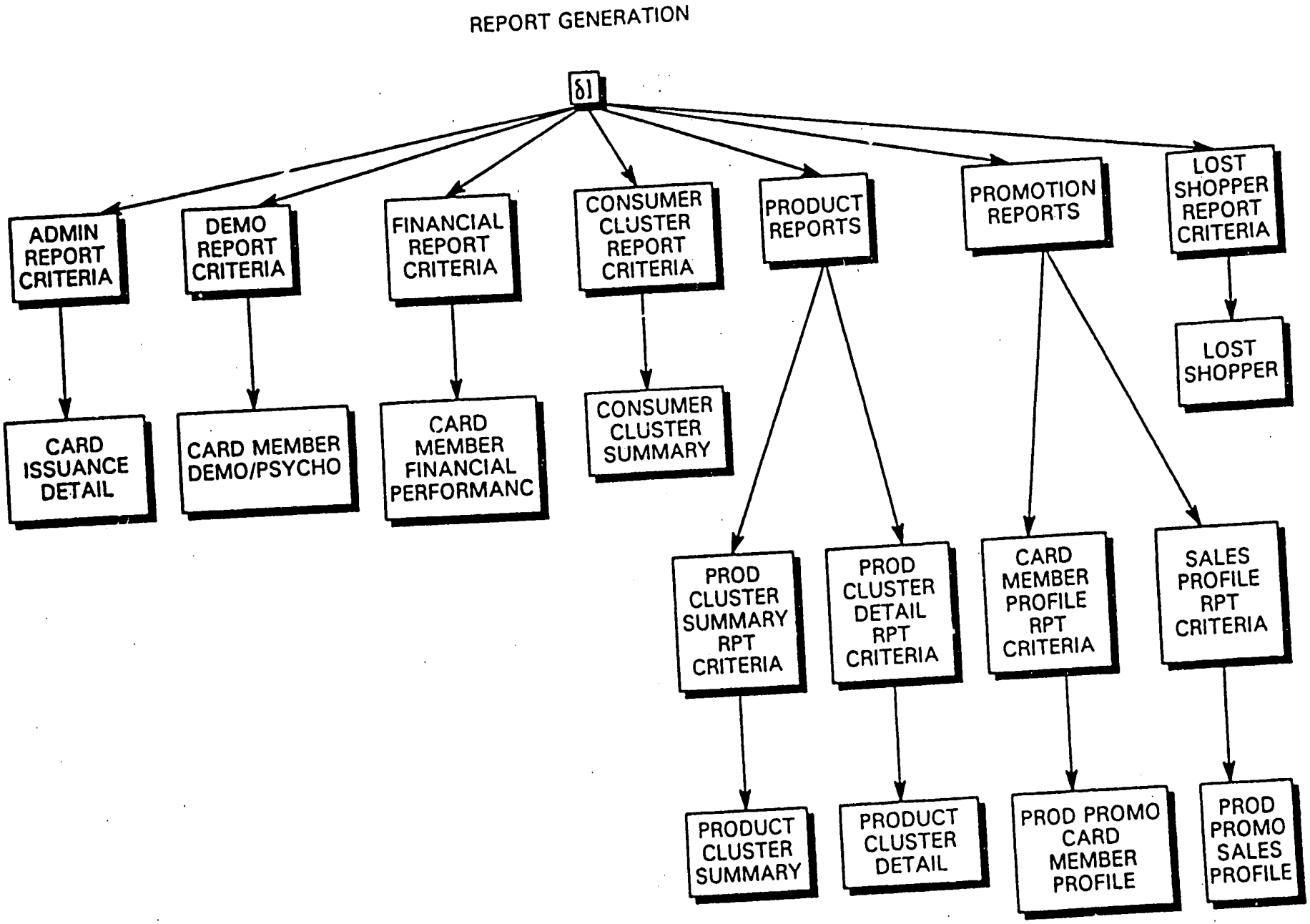

REPORT GENERATION
δ1
ADMIN REPORT CRITERIA
DEMO REPORT CRITERIA
FINANCIAL REPORT CRITERIA
CONSUMER CLUSTER REPORT CRITERIA
PRODUCT REPORTS
PROMOTION REPORTS
LOST SHOPPER REPORT CRITERIA
CARD ISSUANCE DETAIL
CARD MEMBER DEMO/PSYCHO
CARD MEMBER FINANCIAL PERFORMANC
CONSUMER CLUSTER SUMMARY
LOST SHOPPER
PROD CLUSTER SUMMARY RPT CRITERIA
PROD CLUSTER DETAIL RPT CRITERIA
CARD MEMBER PROFILE RPT CRITERIA
SALES PROFILE RPT CRITERIA
PRODUCT CLUSTER SUMMARY
PRODUCT CLUSTER DETAIL
PROD PROMO CARD MEMBER PROFILE
PROD PROMO SALES PROFILE

FIG. 12(b)

FIG. 12(c)

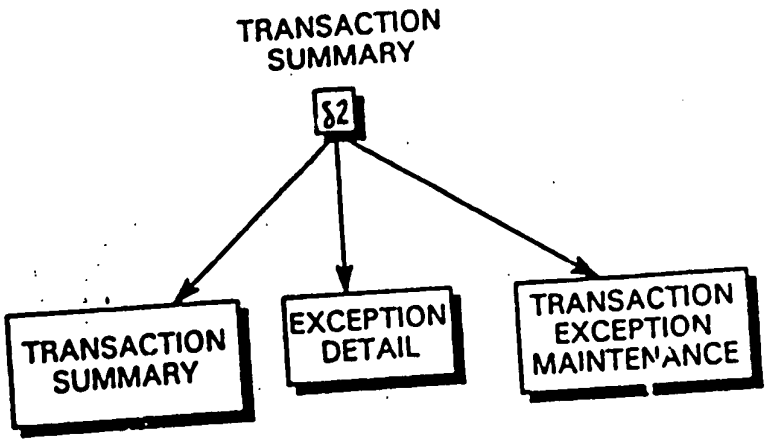


FIG. 12(d)

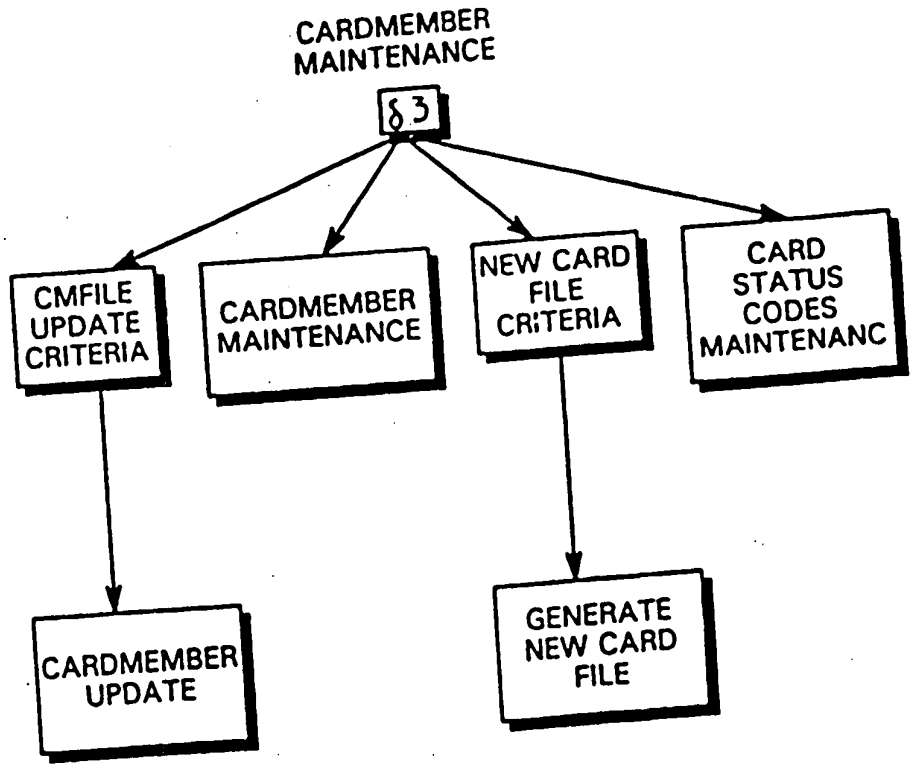


FIG. 12(e)

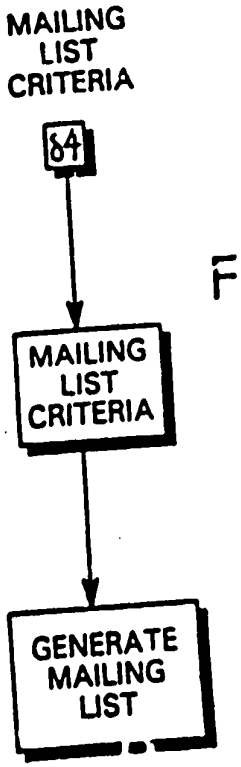


FIG. 12(f)

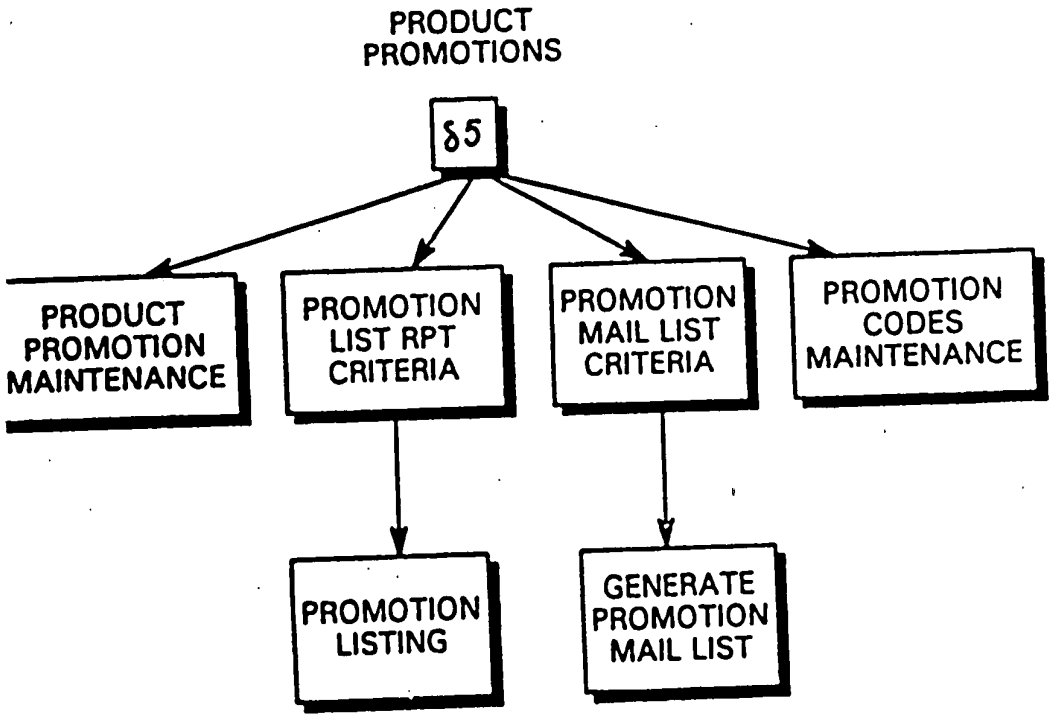


FIG. 12(g) DEMOGRAPHIC MAINTENANCE

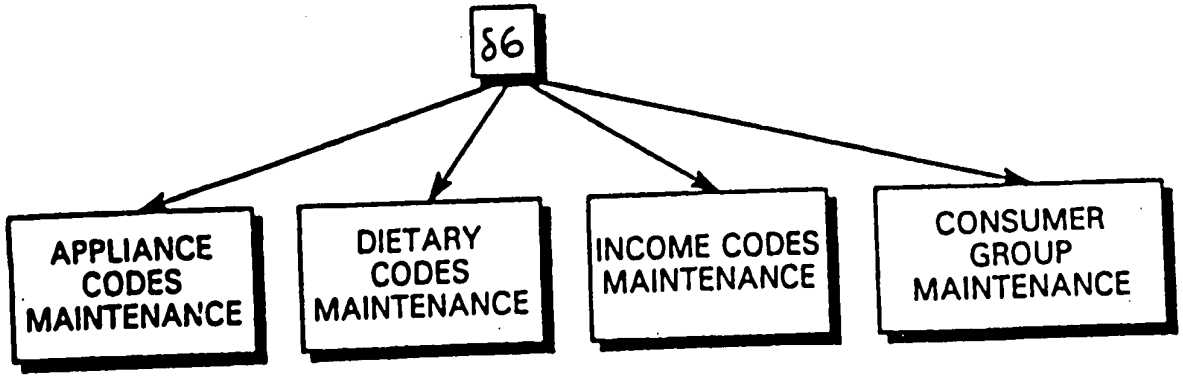


FIG. 12(h)

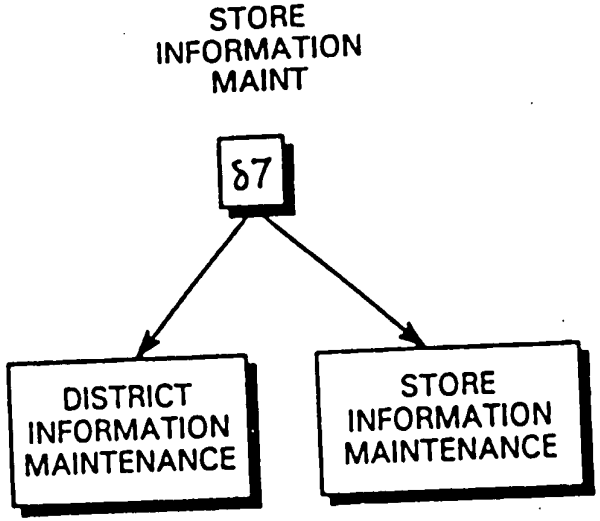
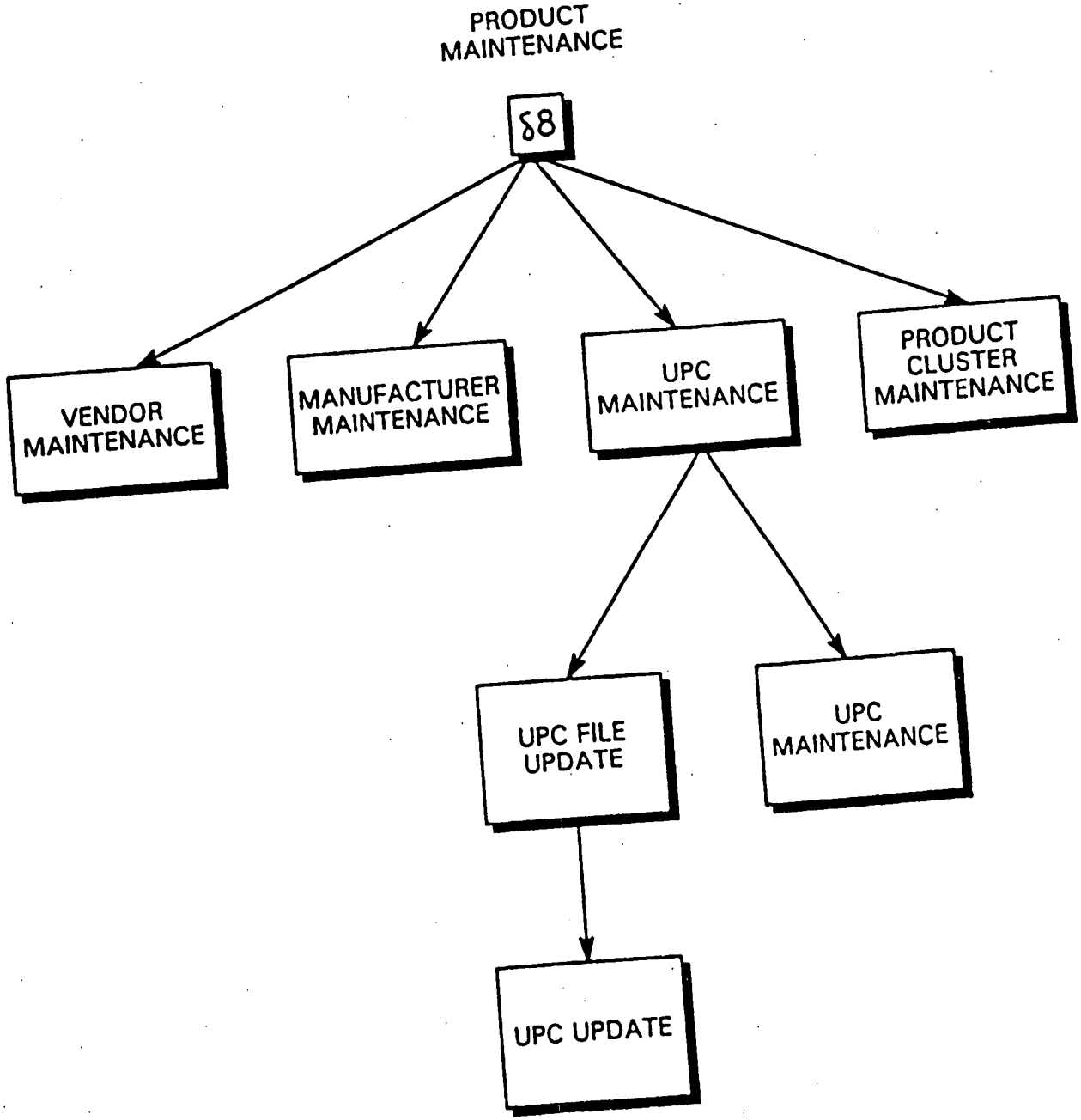


FIG. 12(i)


PRODUCT MAINTENANCE
§8
VENDOR MAINTENANCE
MANUFACTURER MAINTENANCE
UPC MAINTENANCE
PRODUCT CLUSTER MAINTENANCE
UPC FILE UPDATE
UPC MAINTENANCE
UPC UPDATE

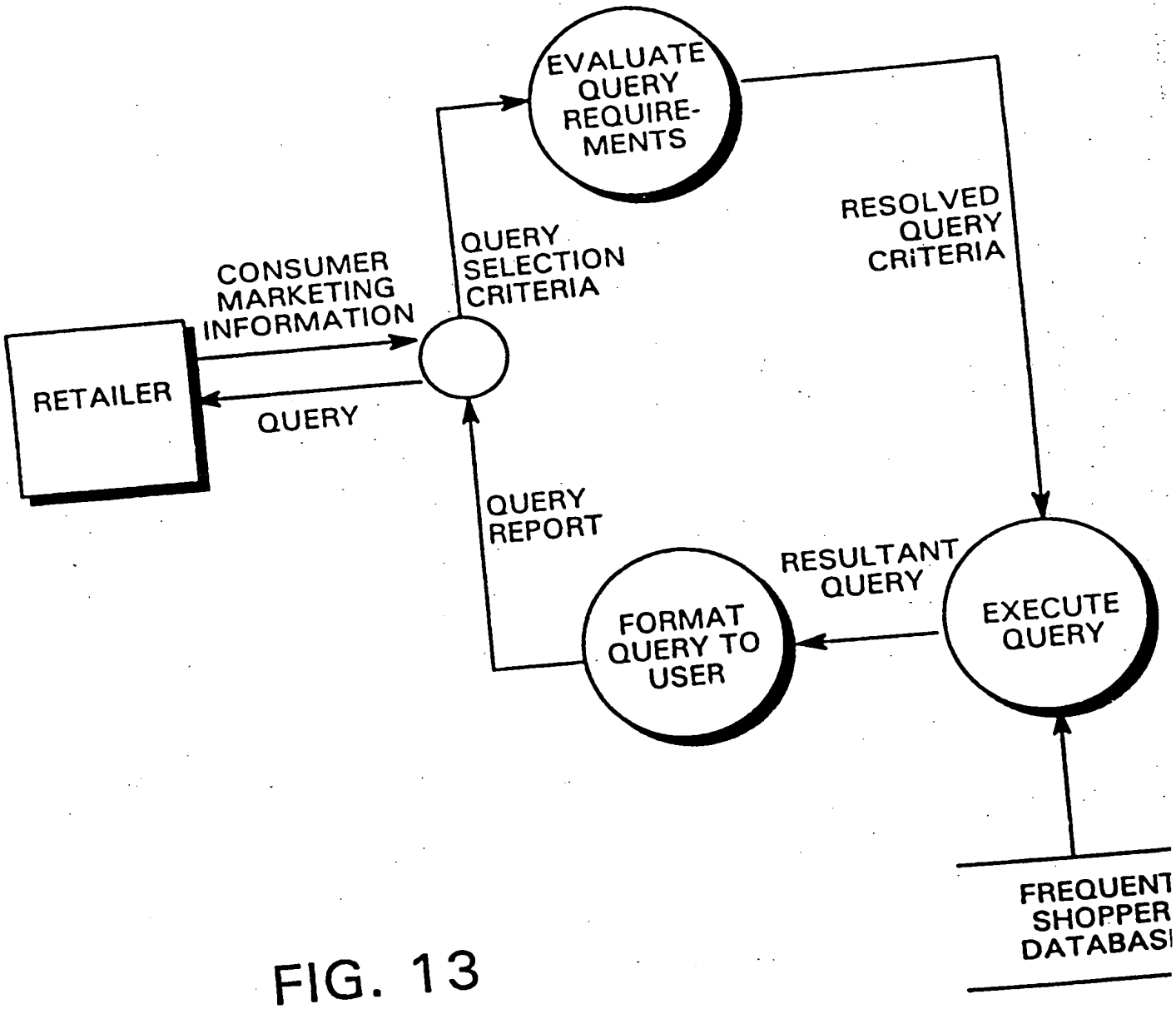

EVALUATE QUERY REQUIRE-MENTS
RESOLVED QUERY CRITERIA
QUERY SELECTION CRITERIA
CONSUMER MARKETING INFORMATION
RETAILER
QUERY
QUERY REPORT
RESULTANT QUERY
FORMAT QUERY TO USER
EXECUTE QUERY
FREQUENT SHOPPER DATABAS

FIG. 13

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